I'm not a robot

The complex Gaussian is a Gaussian Function with a imaginary argument. It is also can be viewed as a sinusoid with a phase that increases quadratically with time. This function arises in the study of optics. The function is given in Equation [1], where k is a positive real constant: [Equation 1] To find the Fourier Transform of the Complex Gaussian, we will make use of the Fourier Transform of the Gaussian Function, along with the scaling property of the Fourier Transform. To start, let's rewrite the complex Gaussian h(t) in terms of the ordinary Gaussian function g(t): [Equation 2] Now, we'd like to use the scaling property of the Fourier Transform directly, but note that the following equation only holds for c being real-valued (not a complex constant, as we are using in Equation [2]): [Equation 3] The magnitude sign in Equation [3] arises because if c is real and negative, the integration limits will flip and the 1/c becomes -1/c (see Scaling Proof for Fourier Transforms. Hence, the generalization of Equation [3] to complex numbers is not valid. However, we are a little bit lucky in this case. The Gaussian Function of Equation [1] is well-defined when the argument becomes complex - that is, the complex exponential is well understood. This isn't the case in general - for instance, what is u(it) - the step function evaluated at a complex argument? There is no simple or consistent way to define it. In this case, we have the constant c being given by: [Equation 4] I apologize for the lack of rigor on this next statement, but basically we need the real and imaginary parts of the scaling constant c to be positive in order to avoid any additional minus signs that will show up in Equation [3]. This is because if the real and imaginary parts of c are positive, we won't need to do a sign change in the integration limits. Assuming k is positive, the resulting Fourier Transform follows since we know G(f), the Fourier Transform of the Gaussian already: [Equation 5] If on the other hand, k is negative, then the constant c in Equation [4] will will be given by: [Equation 6] Hence, k has a negative real part and a positive imaginary part. By multiplying the constant c in Equation [6] by -i, we can force c to have a positive real and imaginary part. Hence, we can find the Fourier Transform of the complex Gaussian for the negative k case: [Equation 7] Hence, the general solution for the Fourier Transform is: [Equation 8] Note that if k=0, then the complex Gaussian is simply a constant, so the Fourier Transform will be the dirac-delta functional. Next: Quadratic Sinusoids Previous: Right-Sided Sinusoids Table of Fourier Transform Pairs The Fourier Transform (Home) On this page, the Fourier Transforms for the sinusois sine and cosine function are determined. The result is easily obtained using the Fourier Transform of the complex exponential. We'll look at the cosine with frequency f=A cycles/second. This cosine function can be rewritten, thanks to Euler, using the identity: [Equation 1]Along with the linearity property of the Fourier transform, the Fourier transform can be easily found: [Equation 2]The integrals from the last lines in equation [2] are easily evaluated using the results of the previous page. Equation [2] states that the fourier transform of the cosine function of frequency A is an impulse at f=A and f=-A. That is, all the energy of a sinusoidal function of frequency A is entirely localized at the frequencies given by |f|=A.The Fourier Transform for the sine function can be determined just as quickly using Euler's identity for the sine function: [Equation 3] The result is: [Equation 4]Note that the Fourier Transform of the real function, sin(t) has an imaginary Fourier Transform (no real part). This is characteristic of odd functions. Fourier transform is a mathematical model that decomposes a function or signal into its constituent frequencies. It helps to transform the signals between two different domains like transforming the frequency domain to the time domain. It is a powerful tool used in many fields, such as signal processing, physics, and engineering, to analyze the frequency content of signals or functions that vary over time or space.In this article, we will explore the Fourier transform in detail along with the formula, forward and inverse Fourier transform, and its properties. What is Fourier Transform?The generalized form of the complex Fourier series is referred to as the Fourier transform. Fourier transforms are used to represent the mathematical functions and frequency domain. It helps to expand the non-periodic functions and convert them into easy sinusoid functions.There are two types of Fourier transform i.e., forward Fourier transform and inverse Fourier transform.Continuous Fourier Transform (CFT)For a continuous-time function f(t), the Fourier transform F() is defined as:F() = \bold{\int\limits_{-\infty}^\infty} f(t)eit dtwhere:F() is the Fourier transform of f(t) is the Angular Frequencyi is the Imaginary Number (i2 = -1)t is TimeFourier Transform FormulaThe formula for the Fourier transforms of a function f(x) is given by:f(x) = \bold{\int\limits_{-\infty}^\infty}F(k)e2ikx dkF(k) = \bold{\int\limits_{-\infty}^\infty}f(x)e-2ikx dxForward Fourier TransformThe forward Fourier transform is a mathematical technique used to transform a time-domain signal into its frequency-domain representation. This transformation is fundamental in various fields, including signal processing, image processing, and communications. Forward Fourier Transform is represented by F(k). The symbol for forward Fourier transform is \hat {f}(k) and is defined as: F(k) = \bold{\int\limits_{-\infty}^\infty}f(x)e-2ikx dxInverse Fourier TransformThe inverse Fourier transform is the process of converting a frequency-domain representation of a signal back into its time-domain form. This is the reverse process of the forward Fourier transform. Inverse Fourier Transform is represented by f(x). Symbol for Inverse Fourier transform is \widecheck {f}(x) and is defined as:f(x) = F^{-1}_k[F(k)] (x) = \bold{\int\limits_{-\infty}^\infty}F(k)e2ikx dkProperties of Fourier TransformVarious properties of Fourier transform are:If a(t) has a Fourier transform A(f), then Fourier transform of A(t) is a(-f). It is called the duality property.Fourier transform is a linear transform. It is called linear transform.Modulation property is the property in which the function is modulated by other function.A shift in the time domain corresponds to a phase shift in the frequency domain in Fourier TransformMultiplying a time-domain signal by a complex exponential corresponds to a shift in the frequency domain in Fourier TransformIn Fourier Transform taking the complex conjugate of the time-domain signal corresponds to taking the complex conjugate of the frequency-domain signal and reversing the frequency.Fourier Transform TableThe table below shows the Fourier transform of various functions.Functions f(x)F(k) = Fx[f(x)]11(k)Sine Functionsin(2k0x)(1/2) i [(k + k0) - (k -k0)]Cosine Functioncos(2k0x)(1/2) [(k + k0) + (k -k0)]Inverse Function-PV(1/x)i[1 - 2H(-k)]Exponential Functione-2k0|x|(1/)[k0 / (k2 + k20)]Gaussian Functione^{-ax^2}\sqrt{\frac{\pi}{a}}e^{-\pi^2k^2/a}Applications of Fourier TransformSome applications of Fourier transform are as follows:Fourier transforms are used in signal processing, telecommunications, audio processing, and image processing.Fourier transforms are used to reduce noise, compression, etc.It is also used to represent the wave propagation, analysis of electrical signals and many more.The special form of Fourier transforms is used to represent periodic functions and infinite series in mathematics.Read More,ConclusionFourier transform is a fundamental tool that has transformed the way we analyze and interpret signals across various domains allowing for the analysis and manipulation of signals in the frequency domain. By transforming signals from the time or spatial domain into the frequency domain, it provides deep insights into the frequency components that constitute complex waveforms. Whether in signal processing, image analysis, or solving differential equations, the Fourier Transform enables precise and efficient analysis, making it indispensable in both theoretical research and practical applications. Understanding its properties and applications is essential for engineers and scientists working with time-series data.Examples on Fourier TransformExample 1: What is the Fourier transform of sin 4x.Solution:To find the Fourier transform of sine function we use formula:Fourier transform of sin(2k0x) = (1/2) i [(k + k0) - (k -k0)]We have to find Fourier transform for sin 4xComparing2k0 = 4k0 = 4/2k0 = 2/Putting in formulaF(k) = (1/2) i [(k + 2/) - (k - 2/)]Example 2: What is Fourier transform of cos 2x.Solution:To find the Fourier transform of cosine function we use formula:Fourier transform of cos(2k0x) = (1/2) [(k + k0) + (k -k0)]We have to find Fourier transform for sin 4xComparing2k0 = 2k0 = 1Putting in formulaF(k) = (1/2) [(k + 1) + (k - 1)]Example 3: Find the Fourier transform of e^{-(\pi/4)x^2}Solution:To find Fourier transform of e^{-ax^2} is \sqrt{\frac{\pi}{a}}e^{-\pi^2k^2/a}We have to find the Fourier transform for e^{-(\pi/4)x^2}Comparing a = / 4Putting in the formulaF(k) = 2 e^{-4\pi k^2} Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Home: The Fourier Transform .com This section gives a list of Fourier Transform pairs. That is, we present several functions and there corresponding Fourier Transforms. The derivation can be found by selecting the image or the text below. For convenience, we use both common definitions of the Fourier Transform, using the (standard for this website) variable f, and the also used "angular frequency" variable . g(t) Square Pulse (Box Function) Triangle Function The Gaussian Constant The Dirac-Delta Impulse Cosine Sine Step Function Signum Function Right-Sided Decaying Exponential Left-Sided Decaying Exponential Two-Sided Decaying Exponential Fourier Transforms TableNote that the following two inversion formulas are used for the definition of the inverse Fourier Transform: Top: Table of Fourier Tranforms The Fourier Transform (Home) This page and the Fourier Transforms Table and Fourier Transform Pairs is copyrighted. Copyright www.thefouriertransform.com, 2010-2025. Feel free to reproduce it as long as the source page is referenced. Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. This is going to be a fun page. We'll introduce the Shah Function, which is also known as the "bed of nails". We'll then derive the Fourier Transform for this function, which gives a surprising result. The Shah Function is defined as a train of impulses, equally spaced in time: [1] In equation [1], the period T is 1. The function of eq [1] is plotted in Figure 1: Figure 1. Plot of Shah Function of Period T=1. The Shah Function is regularly used in the mathematics of digital signal processing (DSP). The function is used in the proof of the Sampling Theorem; notice that the Shah Function multiplied by any function g(t) would only depend on g(t) at the locations of the impulses in the Shah Function - hence, g(t) is "sampled". The Fourier Series of the Shah Function To determine the Fourier Transform of the Shah Function III(t), it is helpful to first find the Fourier Series of III(t). You'll see why in the next section. Since the Shah Function is periodic, it can be represented via a Fourier Series: [2] Hence, we can find the complex Fourier Series coefficients, setting T=1 (note that the integration is from t=-0.5 to +0.5 - we can integrate over any period of the function to calculate the coefficients, and in this case it makes more sense to do it this way than from t=0 to +1): [3] In equation [3], note that the Shah Function reduces from an infinite sum to a simple impulse, because the only impulse that is within the integration region (t=-0.5 to +0.5) is the impulse at t=0. Also, note that the final step used the sifting property. Equation [3] states that the Fourier Series of the Shah Function has complex coefficients c_n that are equal to 1, for all n. This is a very neat property. Hence, we can rewrite the Shah Function, using the Fourier Series representation, in equation [4]: [4] The Fourier Transform of the Shah Function Now that we have the Fourier Series representation of the Shah Function in eq [4], the derivation for the Fourier Transform is fairly straightforward. We simply make use of the change of summation and integration property, and we're done: [5] The integral at the end of the derivation in equation [5] is found using the same math as on the complex exponential page. Hence, we have a very surprising result: The Fourier Transform of the Shah Function is the Shah Function. Most people who know Fourier Transforms know that the Gaussian Function has itself as its own Fourier Transform. But most don't know that the Shah Function also possesses this property. Which makes it even more awesome of a function. Finally, we presents the Fourier Transform of the Shah Function for when the period is not T=1, but rather for an arbitrary (positive) T: [6] Hence, if the Shah Function is sampled "slower" (that is, T>1), then the Fourier Transform has impulses that occur more often (that is, at a frequency 1/T), and scaled by the factor 1/T. Next: The Truncated Cosine Previous: The Decaying Exponential Fourier Transform Pairs List The Fourier Transform (Home) This page on the Fourier Transform of the shah function (bed of nails) is copyrighted. No portion can be reproduced except by permission from the author. Copyright thefouriertransform.com, 2010-2011. Fourier Transform is a mathematical model which helps to transform the signals between two different domains, such as transforming signal from frequency domain to time domain or vice versa. Fourier transform has many applications in Engineering and Physics, such as signal processing, RADAR, and so on. In this article, we are going to discuss the formula of Fourier transform, properties, tables, Fourier cosine transform, Fourier sine transform with complete explanations.What is Fourier Transform?The generalisation of the complex Fourier series is known as the Fourier transform. The term Fourier transform can be used in the mathematical function, and it is also used in the representation of the frequency domain. The Fourier transform helps to extend the Fourier series to the non-periodic functions, which helps us to view any functions in terms of the sum of simple sinusoids.Fourier Transform FormulaAs discussed above, the Fourier transform is considered to be a generalisation of the complex Fourier series in the limit L. Also, convert discrete An to the continuous F(k)dk and let n/Lk. Finally, convert the sum to an integral.Thus, the Fourier transform of a function f(x) is given by:\(\begin{array}{l}f(x) =\int_{-\infty }^{\infty }F(k)e^{2\pi ikx}dk \end{array} \)\(\begin{array}{l}F(k)= \int_{-\infty }^{\infty }f(x)e^{-2\pi ikx}dx\end{array} \) From the Fourier transform formula, we can derive the forward and inverse Fourier transform.\(\begin{array}{l}F(k)= F_{x}[f(x)](k) = \int_{-\infty }^{\infty }f(x)e^{-2\pi ikx}dx\end{array} \) is known as the forward Fourier transform or simply Fourier transform.\(\begin{array}{l}f(x) = F^{-1}_{k}[F(k)](x)= \int_{-\infty }^{\infty }F(k)e^{2\pi ikx}dk\end{array} \) is known as the inverse Fourier transform.The symbols used to denote the forward and inverse Fourier transform are given as follows:\(\begin{array}{l}Forward\ Fourier\ Transform\ : \hat{f}(k)\end{array} \)\(\begin{array}{l}Inverse\ Fourier\ Transform\ : \check{f}(x)\end{array} \)Fourier Transform PropertiesThe following are the important properties of Fourier transform:Duality If h(t) has a Fourier transform H(f), then the Fourier transform of H(t) is H(-f).Linear transform Fourier transform is a linear transform. Let h(t) and g(t) be two Fourier transforms, which are denoted by H(f) and G(f), respectively. In this case, we can easily calculate the Fourier transform of the linear combination of g and h.Modulation property According to the modulation property, a function is modulated by the other function, if it is multiplied in time.Fourier Transform in Two DimensionsFourier transform in two-dimensions is given as follows:\(\begin{array}{l}F(x, y)= \int_{-\infty }^{\infty }\int_{-\infty }^{\infty }f(k_{x}, k_{y})e^{-2\pi i(k_{x}x + k_{y}y)}dk_{x}dk_{y}\end{array} \)\(\begin{array}{l}f(k_{x}, k_{y})= \int_{-\infty }^{\infty }\int_{-\infty }^{\infty }F(x, y)e^{2\pi i(k_{x}x + k_{y}y)}dx dy\end{array} \) The following table presents the Fourier transform for different functions:Functionf(x)F(k) = Fx [f(x)]Fourier Transform: 11\(\begin{array}{l}\delta(k) \end{array} \)Fourier Transform: Sine Function\(\begin{array}{l}sin (2\pi k_{0}x)\end{array} \)\(\begin{array}{l}\frac{1}{2}i[\delta (k + k_{0})-\delta(k-k_{0})]\end{array} \)Fourier Transform: Cosine Function\(\begin{array}{l}cos (2\pi k_{0}x)\end{array} \)\(\begin{array}{l}\frac{1}{2}[\delta (k k_{0})+\delta(k+k_{0})]\end{array} \)Fourier Transform: Inverse Function\(\begin{array}{l}1 \{\pi x\}\end{array} \)\(\begin{array}{l}i[1 2H(-k)]\end{array} \)Fourier Transform: Exponential Function\(\begin{array}{l}e^{-2\pi k_{0}|x|}\end{array} \)\(\begin{array}{l}\frac{1}{\pi }\frac{k_{0}}{k^{2}+k_{0}^{2}}\end{array} \)Fourier Transform: Gaussian Function\(\begin{array}{l}e^{-ax^{2}}\end{array} \)\(\begin{array}{l}\sqrt{\frac{\pi }{a}}e^{-\pi ^{2}k^{2}/a}\end{array} \)Applications of Fourier TransformFourier transform is used in a wide range of applications, such as:Image CompressionImage AnalysisImage FilteringImage Reconstruction Fourier Sine TransformThe Fourier sine transform is defined as the imaginary part of full complex Fourier transform, and it is given by:\(\begin{array}{l}F_{x}^{(s)}[f(x)](k) = I [F_{x}[f(x)](k)]\end{array} \)\(\begin{array}{l}F_{x}^{(s)}[f(x)](k) = \int_{-\infty }^{\infty }sin(2\pi kx)f(x)dx\end{array} \) The Fourier transform for cosines of a real function is defined as the real part of a full complex Fourier transform.\(\begin{array}{l}F_{x}^{(c)}[f(x)](k) = R[F_{x}[f(x)](k)]\end{array} \)\(\begin{array}{l}F_{x}^{(c)}[f(x)](k) = \int_{-\infty }^{\infty }cos(2\pi kx)f(x)dx\end{array} \)Yes, Fourier transform is the generalised form of a complex Fourier series.Fourier transform is one of the important concepts used in image processing, which helps to decompose the image into the sine and cosine components.The Laplace transform is used to analyse the unstable system, and has a convergence factor. Whereas, the Fourier transform cannot be used to analyse the unstable systems, and it does not have any convergence factor.The properties of Fourier transform are:Linearity propertyFrequency shifting propertyTime reversal propertyTime-shifting property, and so on.Yes, the Fourier transform is linear.The Fourier transform is used in the transition of signal from the time spectrum to the frequency spectrum. On this page, the Fourier Transform for the box function, or square pulse, is given. This page is pretty much a rehash of the page in the Fourier Transform theory section. The box function is a square pulse, as shown in Figure 1: Figure 1. The box function. In Figure 1, the function g(t) has amplitude of A, and extends from t=-T/2 to t=T/2. For |t|>T/2, g(t)=0. We will write the square pulse or box function as rect_T(t), indicating that the rectangle function is equal to 1 for a period of T (from -T/2 to +T/2) and 0 elsewhere: Using the definition of the Fourier Transform (Equation [1] on the intro page), the integral is evaluated: [1] The solution, G(f), is often written as the sinc function, which is defined as: [Equation 2][While sinc(0) isn't immediately apparent, using L'Hopitals rule or whatever special powers you have, you can show that sinc(0) = 1] The Fourier Transform of g(t) is G(f),and is plotted in Figure 2 using the result of equation [2]. Figure 2. The sinc function is the Fourier Transform of the box function. To learn some things about the Fourier Transform that will hold in general, consider the square pulses defined for T=10, and T=1.These functions along with their Fourier Transforms are shown in Figures 3 and 4, for the amplitude A=1. Figure 3. The Box Function with T=10, and its Fourier Transform. Figure 4. The Box Function with T=1, and its Fourier Transform. A fundamental lesson can be learned from Figures 3 and 4. From Figure 3, note that the wider square pulse produces a narrower, more constrained spectrum (the Fourier Transform). From Figure 4, observe that the thinner square pulse produces a wider spectrum than in Figure 3. This fact will hold in general: rapidly changing functions require more high frequency content (as in Figure 4). Functions that are moving more slowly in time will have less high frequency energy (as in Figure 3). In the next section, we'll look at the Fourier Transform of the triangle function. Previous: The Box FunctionFourier Transform PairsNext: The Gaussian The Fourier Transform of the triangle function is derived on this page. The unit triangle function is given in Figure 1: Figure 1. The triangle function. Mathematically, the triangle function can be written as: [Equation 1] We'll give two methods of determining the Fourier Transform of the triangle function.Method 1. Integration by Parts We can simply substitute equation [1] into the formula for the definition of the Fourier Transform, then crank through all the math, and then get the result. This is pretty tedious and not very fun, but here we go: The Fourier Transform of the triangle function is the sinc function squared. Now, you can go through and do that math yourself if you want. It's a complicated set of integration by parts, and then factoring the complex exponential such that it can be rewritten as the sine function, and so on. It's an ugly solution, and not fun to do. Method 2, using the convolution property, is much more elegant.Method 2. Using the Convolution Property The convolution property was given on the Fourier Transform propertiespage, and can be used to find Fourier Tranforms of functions. In some cases, as in this one, the property simplifies things. If you've studied convolution, or you've sat down and thought about it, or you are very clever, you may know that the triangle function is actually the convolution of the box function with itself. That is, let's simplifybox function on the previous page, g(t) such that the amplitude A=1 and T=1, then the box function is simply: [Equation 2]The triangle function can be mathematically expressed as the unit box function convolved with itself: [Equation 3] If you recall the convolution property of Fourier Transforms, we know that the Fourier Transform of the convolution of functions g1 and g2 is just the product of Fourier Transform of the individual functions: (G1 times G2). Since we know the Fourier Transform of the box function is the sinc function, and the triangle function is the convolution of the box function with the box function, then the Fourier Transform of the triangle function must be the sinc function multiplied by the sinc function. That is: [Equation 4] So we arrive at the same solution as the brute-force calculus method, but we get there using a much simpler and more intelligent method. Either way, at the end of the day the Fourier Transform of the triangle function is the sinc function squared. This pair is shown in Figure 2. Figure 2. The triangle function and its Fourier Transform the sinc squared function. Next: Fourier Transform of the Gaussian Previous: Fourier Transform of the Box (Square Pulse) FunctionFourier Transform Pairs (List) The Fourier Transform (Home) ,the free encyclopedia that anyone can edit.117,937 active editors 7,001,591 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.Members of the victorious Blondie crewThe Boat Race 2018 took place on 24March. Held annually, The Boat Race is a side-by-side rowing race between crews from the universities of Oxford and Cambridge along a 4.2-mile (6.8km) tidal stretch of the River Thames in south-west London, England. For the third time in the history of the event, the men's, the women's and both reserves' races were all held on the Tideway on the same day. The women's race saw Cambridge lead from the start, eventually winning by a considerable margin to take the overall record to 4330 in their favour. In the women's reserve race, Cambridge's Blondie (crew pictured) defeated Oxford's Osiris by nine lengths. The men's reserve race was won by Cambridge's Goldie, who defeated Oxford's Isis by a margin of four lengths. The men's race was the final event of the day and completed a whitewash as Cambridge won, taking the overall record to 8380 in their favour. The races were watched by around 250,000 spectators live, and broadcast around the world. (Fullarticle...)Recently featured: Radar, Gun Laying, Mk.I and Mk.IIAndrea NavageroNosy KombaArchiveBy emailMore featured articlesAboutKitty Marion... that Kitty Marion (pictured) was force-fed over 200 times during a hunger strike?... that the North Korean destroyer Choe Hyon is the largest ship constructed for the Korean People's Navy?... that after the release of High and Low, director Akira Kurosawa received telephone calls imitating his film that threatened to kidnap his daughter?... that May Bradford Shockley is why Silicon Valley is where it is?... that the conservation of a goat might endanger the survival of Aquilegia paui?... that Joy Laking predicted in a school writing assignment that within ten years she would be making a living as an artist?... that the Taiwanese restaurant chain Formosa Chang drew inspiration from McDonald's for its non-greasy atmosphere and corporate practices?... that Haridas Mitra had his death sentence commuted after the intervention of Mahatma Gandhi?... that "Steve's Lava Chicken" recently became the shortest song to enter the UK Top 40?ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.In basketball, the EuroLeague concludes with Fenerbahe winning the Final Four Playoff.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Harrison Ruffin TylerPhil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollyNominate an articleMay 31: Dragon Boat Festival in China and Taiwan (2025); World No Tobacco DayBessarion455 Petronius Maximus, the ruler of the Western Roman Empire, was stoned to death by a mob as he fled Rome ahead of the arrival of a Vandal force that sacked the city.1223 Mongol invasion of Kievan Rus': Mongol forces defeated a Kievan Rus' army at the Battle of the Kalka River in present-day Ukraine.1468 Cardinal Bessarion (pictured) announced his donation of 746 Greek and Latin codices to the Republic of Venice, forming the Biblioteca Marciana.1935 A magnitude-7.7 earthquake struck Balochistan in British India, now part of Pakistan, killing between 30,000 and 60,000 people.2013 A tornado struck Central Oklahoma, killing eight people and injuring more than 150 others.Albertino Mussato (d.1329)Joseph Grimaldi (d.1837)Dina Boluarte (b.1962)Mbaye Diagne (d.1994)More anniversaries: May 30May 31June 1ArchiveBy emailList of days of the yearAboutCucumis metuliferus, the African horned cucumber, is an annual vine in the cucumber and melon family, Cucurbitaceae. Its fruit has horn-like spines, hence the name "horned melon". The ripe fruit has orange skin and lime-green, jelly-like flesh. It is native to Southern Africa, where it is a traditional food. Along with the gemsbok cucumber and the citron melon, it is one of the few sources of water during the dry season in the Kalahari Desert. This photograph, which was focus-stacked from 25 separate images, shows two C.metuliferus fruits, one whole and the other in cross-section.Photograph credit: Ivar LeidusRecently featured: Ignace TonenAustralian white ibisHell Gate BridgeArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortugusSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2This article is about the year 455. For other uses, see 455 (disambiguation).This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources:"455"news newspapers books scholar JSTOR (April 2019) (Learn how and when to remove this message)Calendar yearYearsMillennium1stmillenniumCenturies4thcentury5thcentury 6thcenturyDecades430s440s450s 460s470sYears452453454455 456457458vte455 by topicLeadersPolitical entitiesState leadersReligious leadersCategoriesBirthsDeathsDisestablishmentsvte455 in various calendarsGregorian calendar455CDLVAb urbe condita1208Assyrian calendar5205Balinese saka calendar376377Bengali calendar139 138Berber calendar1405Buddhist calendar999Burmese calendar183Byzantine calendar59635964Chinese calendar (WoodHorse)3152 or 2945to (WoodGoat)3153 or 2946Coptic calendar171172Discordian calendar1621Ethiopian calendar447448Hebrew calendar42154216Hindu calendars- Vikram Samvat511512- Shaka Samvat376377- Kali Yuga35553556Holocene calendar10455Iranian calendar167 BP 166 BPIslamic calendar172 BH 171 BHJavanese calendar340341Julian calendar455CDLVKorean calendar2788Minguo calendar1457 before ROC1457Nanakshahi calendar1013Seleucid era766/767 AGThai solar calendar997998Tibetan calendar(male Wood-Horse)581 or 200 or 572to(female Wood-Goat)582 or 201 or 571King Genseric sacks Rome (455)Year 455 (CDLV) was a common year starting on Saturday of the Julian calendar. At the time, it was known as the Year of the Consulship of Valentinianus and Anthemius (or, less frequently, year 1208 Ab urbe condita). The denomination 455 for this year has been used since the early medieval period, when the Anno Domini calendar era became the prevalent method in Europe for naming years.March 16 Emperor Valentinian III, age 35, is assassinated by two Hunnic retainers of the late Flavius Aetius, while training with the bow on the Campus Martius (Rome), ending the Theodosian dynasty. His primicerius sacri cubiculi, Heraclius, is also murdered.March 17 Petronius Maximus, former domesticus ("elite bodyguard") of Aetius, becomes (with support of the Roman Senate) emperor of the Western Roman Empire. He secures the throne by bribing officials of the imperial palace. Maximus consolidates his power by a forced marriage with Licinia Eudoxia, widow of Valentinian III.Maximus appoints Avitus, most trusted general, to the rank of magister militum and sends him on an embassy to Toulouse, to gain the support of the Visigoths. He elevates his son Palladius to Caesar and has him marry Eudocia, eldest daughter of Valentinian III.May 31 Maximus is stoned to death by an angry mob while fleeing Rome. A widespread panic occurs when many citizens hear the news that the Vandals are plundering the Italian mainland.June 2 Sack of Rome: King Genseric leads the Vandals into Rome, after he has promised Pope Leo I not to burn and plunder the city. Genseric sacks the city for a period of two weeks. Eudoxia and her daughters, Eudocia and Placidia, are taken hostage. The loot is sent to the harbour of Ostia and loaded into ships, from whence the Vandals depart and return to Carthage.July 9 Avitus is proclaimed Roman emperor at Toulouse, and later recognised by the Gallic chiefs in Viernum (near Arles).September 21 Avitus enters Rome with a Gallic army. He restores the imperial authority in Noricum (modern Austria) and leaves a Gothic force under Remistus, Visigoth general (magister militum), at Ravenna.The Ostrogoths conquer Pannonia and Dalmatia.Battle of Aylesford: Prince Vortimer rebels against the pro-Anglo-Saxon policies of his father, Vortigern. He is defeated in the battle at Aylesford (Kent). Hengist and his son Oisc become king of Kent. Horsa and Catigern, brother of Vortimer, are killed. The Britons withdraw to London (according to the Anglo-Saxon Chronicle).Skandagupta succeeds Kumaragupta I as ruler of the Gupta Empire (India). During his reign he crushes the Hun invasion; however, the expense of the wars drains the empire's resources and contributes to its decline.Gaero becomes king of the Korean kingdom of Baekje.[1]Earliest recorded date at Chichen Itza on the Yucatn Peninsula (Mexico) (approximate date).Barter economy replaces organized trade as Romans and other citizens desert their towns for the countryside, where they will be less vulnerable to barbarian raids (approximate date).The city of Vindobona (Vienna) is struck by an epidemic that spreads through the Roman provinces. The disease is probably streptococcus or a form of scarlet fever with streptococcus pneumoniae (approximate date).Rusticus, archbishop of Lyon (approximate date)Wang Baoming, empress of the Southern Qi (d. 512)March 16Valentinian III, emperor of the Western Roman Empire (b. 419)Heraclius, Roman courtier (primicerius sacri cubiculi)May 31 Petronius Maximus, emperor of the Western Roman EmpireBiyu of Baekje, king of Baekje[1]Catigern, prince and son of Vortigern (approximate date)Horsa, leader of the Anglo-Saxons (approximate date)Kumaragupta I, ruler of the Gupta Empire (India)Niall Noigiallach, High King of Ireland (approximate date)Palladius, son of Petronius Maximus (approximate date)Prosper of Aquitaine, disciple and Christian writer (approximate date)^ a b "List of Rulers of Korea". www.metmuseum.org. Retrieved April 20, 2019.Retrieved from " 3One hundred years, from 301 to 400Millennia1stmillenniumCenturies3rdcentury4thcentury5thcenturyTimelines3rdcentury4thcentury5thcenturyState leaders3rdcentury4thcentury5thcenturyDecades300s310s320s330s340s350s360s370s380s390sCategories:Births Deaths Establishments DisestablishmentsvteEastern Hemisphere at the beginning of the 4th century CE.Eastern Hemisphere at the end of the 4th century CE.The 4th century was the time period from 301 CE (represented by the Roman numerals CCCI) to 400 CE (CD) in accordance with the Julian calendar. In the West, the early part of the century was shaped by Constantine the Great, who became the first Roman emperor to adopt Christianity. Gaining sole reign of the empire, he is also noted for re-establishing a single imperial capital, choosing the site of ancient Byzantium in 330 (over the current capitals, which had effectively been changed by Diocletian's reforms to Milan in the West, and Nicomedeia in the East) to build the city soon called Nova Roma (New Rome); it was later renamed Constantinople in his honor.The last emperor to control both the eastern and western halves of the empire was Theodosius I. As the century progressed after his death, it became increasingly apparent that the empire had changed in many ways since the time of Augustus. The two-emperor system originally established by Diocletian in the previous century fell into regular practice, and the east continued to grow in importance as a centre of trade and imperial power, while Rome itself diminished greatly in importance due to its location far from potential trouble spots, like Central Europe and the East. Late in the century Christianity became the official state religion, and the empire's old pagan culture began to disappear.[citation needed] General prosperity was felt throughout this period, but recurring invasions by Germanic tribes plagued the empire from 376[1][2] CE onward. These early invasions marked the beginning of the end for the Western Roman Empire.In China, the Jin dynasty, which had united the nation prior in 280, began rapidly facing trouble by the start of the century due to political infighting, which led to the insurrections of the northern barbarian tribes (starting the Sixteen Kingdoms period), which quickly overwhelmed the empire, forcing the Jin court to retreat and entrench itself in the south past the Yangtze river, starting what is known as the Eastern Jin dynasty around 317. Towards the end of the century, Emperor of the Former Qin, Fu Jin, united the north under his banner, and planned to conquer the Jin dynasty in the south, so as to finally reunite the land, but was decisively defeated at the Battle of Fei River in 383, causing massive unrest and civil war in his empire, thereby leading to the fall of the Former Qin, and the continued existence of the Eastern Jin dynasty.According to archaeologists, sufficient archaeological evidence correlates of state-level societies coalesced in the 4th century to show the existence in Korea of the Three Kingdoms (300/400668 CE) of Baekje, Goguryeo, and Silla.Historians of the Roman Empire refer to the "Long Fourth Century" to the period spanning the fourth century proper but starting earlier with the accession of the Emperor Diocletian in 284 and ending later with the death of Honorius in 423 or of Theodosius II in 450.[3]See also: Christianity in the 4th centuryGregory the Illuminator mosaic, converted Armenia from Zoroastrianism to ChristianityContemporary bronze head of Constantine I (r. 306337 AD)Early 4th century Former audience hall now known as the Basilica, Trier, Germany, is built.Early 4th century The Gupta Empire is established.301: Armenia first to adopt Christianity as state religion.304439: The Sixteen Kingdoms in China begins.306337: Constantine the Great, ends persecution of Christians in the Roman Empire (see also Constantinian shift) and Constantinople becomes new seat of government (New Rome).Tikal had a population of about 100,000 when it was conquered by Teotihuacan, less than a fourth of its peak population[4]320: Butuan Boat One, the oldest known Balangay, a multi-purpose ship native to the Philippines is built.325328: The Kingdom of Aksum adopts Christianity.325: Constantine the Great calls the First Council of Nicaea to pacify Christianity in the grip of the Arian controversy.335380: Samudragupta expands the Gupta Empire.337: Constantine the Great is baptized a Christian on his death bed.350: About this time the Kingdom of Aksum conquers the Kingdom of Kush.350400: At some time during this period, the Huns began to attack the Sassanid Empire.[2]350: The Kutai Martadipura kingdom in eastern Borneo produced the earliest known stone inscriptions in Indonesia known as the Mulavarman inscription written in the Sanskrit language using Pallava scripture.[5]Mid-4th century Dish, from Mildenhall, England, is made. It is now kept at the British Museum, London.Mid-4th century Wang Xizhi makes a portion of a letter from the Feng Ju album. Six Dynasties period. It is now kept at National Palace Museum, Taipei, Taiwan, Republic of China.365: An earthquake with a magnitude of at least eight strikes the Eastern Mediterranean. The following tsunami causes widespread destruction in Crete, Greece, Libya, Egypt, Cyprus, and Sicily.376: Visigoths appear on the Danube and are allowed entry into the Roman Empire in their flight from