

September 14, 2026

National Cream-filled Donut Day

Today in History:

McKinley dies of infection from gunshot wounds (1901)

Handel finishes the *Messiah* (1741)

Number of the Day: 829

829 is prime

829 is a centered triangular number.

Fun Fact:

51% of people think stormy weather affects cloud computing.

Quote of the Day:

"Failure is simply the opportunity to begin again, this time more intelligently."

-Henry Ford

Today's Weather:

Mostly sunny this afternoon, High 67°

Math 121

Quiz #11

Pick up Blue Book.

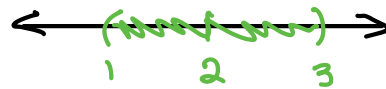
mpod 11

* 7

$$\lim_{x \rightarrow 2} x^2 = 4$$

$$|x^2 - 4| < \varepsilon$$

$$|(x-2)(x+2)| < \varepsilon$$



$$x \leq 3$$

$$x+2 \leq 5$$

$$|(x-2)(x+2)| < \underbrace{|(x-2)| \cdot 5}_{\delta} < \varepsilon$$

$$|x-2| < \frac{\varepsilon}{5}$$

$$\delta = \frac{\varepsilon}{5}$$

F22
(1b)

$$f(x) = \frac{x + x^{-1}}{(x+2)(x-3)} = \frac{x + \frac{1}{x}}{(x+2)(x-3)}$$

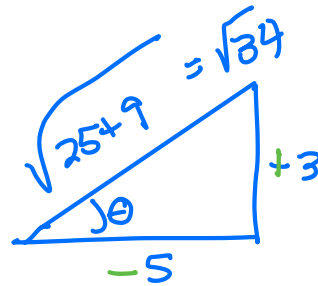
$$x \neq -2, 3, 0$$

TIR)
*10

$$\sin(\arctan(-\frac{3}{5}))$$

$$\theta = \arctan(-\frac{3}{5})$$

$$\tan \theta = -\frac{3}{5}$$



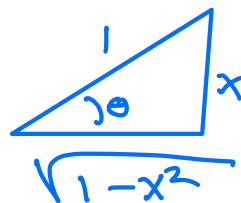
$$\sin(\theta) = \frac{-3}{\sqrt{34}}$$

F25
(2c)

$$\tan(\arcsin x)$$

$$\theta = \arcsin x$$

$$\sin \theta = x$$



$$\tan(\theta) = \frac{x}{\sqrt{1-x^2}}$$

(C)

F24
(3d)

$$\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{\sqrt{x+6} - 3}$$

$$\begin{aligned}
 & \lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{\sqrt{x+6} - 3} \cdot \left(\frac{\sqrt{x+1} + 2}{\sqrt{x+1} + 2} \right) \cdot \left(\frac{\sqrt{x+6} + 3}{\sqrt{x+6} + 3} \right) \\
 &= \lim_{x \rightarrow 3} \frac{(x+1-4)(\sqrt{x+6}+3)}{(x+6-9)(\sqrt{x+1}+2)} \\
 &= \lim_{x \rightarrow 3} \frac{\cancel{(x-3)}(\sqrt{x+6}+3)}{\cancel{(x-3)}(\sqrt{x+1}+2)} = \frac{6}{4} = \frac{3}{2}
 \end{aligned}$$

F25
(4b) $\lim_{x \rightarrow 0} x^2 \cos\left(\frac{1}{x^2}\right) = 0$

$$-1 \leq \cos\left(\frac{1}{x^2}\right) \leq 1$$

$$-x^2 \leq x^2 \cos\left(\frac{1}{x^2}\right) \leq x^2$$

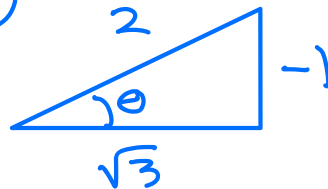
↘ 0
↘ 0

TR1
(*)

$$\cot\left(\arcsin\left(-\frac{1}{2}\right)\right)$$

$$\Theta = \arcsin\left(-\frac{1}{2}\right)$$

$$\sin \Theta = -\frac{1}{2}$$



$$\cot(\Theta) = \frac{\sqrt{3}}{-1}$$

$$\sinh x = \frac{e^x - e^{-x}}{2} \quad \cosh x = \frac{e^x + e^{-x}}{2}$$

F23
(4b) $\lim_{x \rightarrow 0} \frac{\tan 4x}{x \sec x}$

$$= \lim_{x \rightarrow 0} \frac{4 \frac{\sin(4x)}{\cos(4x)} \cdot \frac{1}{4x} \cdot \frac{\cos x}{1}}$$

$$= 4 \cdot 1 \cdot 1 \cdot 1 = 4$$

TI R)
(17) $\lim_{x \rightarrow 0} \frac{\frac{1}{\sqrt{1+x}} - 1}{x}$

$$= \lim_{x \rightarrow 0} \frac{1 - \sqrt{1+x}}{x \sqrt{1+x}} \left(\frac{1 + \sqrt{1+x}}{1 + \sqrt{1+x}} \right)$$

$$= \lim_{x \rightarrow 0} \frac{\cancel{1} - (\cancel{1} + x)}{\cancel{x} \sqrt{1+x} (1 + \sqrt{1+x})} = \frac{-1}{2}$$

mpod 6
*6 $f(x) = \begin{cases} x + c & x < 0 \\ 4 - x^2 & x \geq 0 \end{cases}$

$$\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} x + c = c$$

$$\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} 4 - x^2 = 4$$

$$\boxed{C = 4}$$

F25
4a

$$\lim_{x \rightarrow 0} \frac{x \sin x}{1 - \cos x} \cdot \frac{(1 + \cos x)}{(1 + \cos x)}$$

$$= \lim_{x \rightarrow 0} \frac{x \sin x (1 + \cos x)}{1 - \cos^2 x}$$

$$= \lim_{x \rightarrow 0} \frac{\cancel{x} \sin x (1 + \cos x)}{\sin^2 x}$$

$$= 1 \cdot 2 = 2$$

F23
3b

$$\lim_{a \rightarrow b} \frac{a^2 - 3ab + 2b^2}{a - b}$$

$$= \lim_{a \rightarrow b} \frac{\cancel{(a - b)}(a - 2b)}{\cancel{(a - b)}} = -b$$

F22
3d

$$\lim_{x \rightarrow 0} \frac{\sin 3x}{2x^2 + 5x}$$

$$= \lim_{x \rightarrow 0} \frac{3 \sin 3x}{3x(2x + 5)} = 3(1)\left(\frac{1}{5}\right)$$

$$= \frac{3}{5}$$