19. Find the points of discontinuity, if any: $f(x)=\begin{cases}2x+3 & \text{if } x\le 4\\ 7+\dfrac{16}{x} & \text{if } x>4\end{cases}$

$x=0$

continuity

$\lim_{x\to a} f(x) = f(a)$

$\lim_{x\to 4^+} f(x) = \lim_{x\to 4^-} f(x) = f(4)$

$\lim_{x\to 4^+} 7+\frac{16}{x} = \lim_{x\to 4^-} 2x+3 = 2(4)+3$

✓ $11 = 11 = 11$

$\therefore f(x)$ is cnt. at $x=4$

→ None

18. Given: $f(x) = 5x^3 + x$. If $g(x) = f^{-1}(x)$, find $g'(6)$.

$= \frac{1}{f'(1)} = \frac{1}{16}$

$6 = 5x^3 + x$

$x = 1$

$f'(x) = 15x^2 + 1 \Big|_{x=1} = 16$

20. Find a value for the constant k, if possible, that will make the function continuous:

(a) $f(x) = \begin{cases} 7x - 2 & \text{if} \quad x \le 1 \\ kx^2 & \text{if} \quad x > 1 \end{cases}$ $k=5$

$\lim_{x \to 1^+} kx^2 = \lim_{x \to 1^-} 7x-2 = 7(1)-2$

$K = 5 = 5$

25. Find a nonzero value for the constant k that makes

$$f(x)=\begin{cases}\dfrac{\tan kx}{x} & \text{if} \quad x<0\\ 3x+2k^2 & \text{if} \quad x\geq 0\end{cases}$$

continuous at x = 0.

$$?=\frac{\tan 0}{0}=3(0)+2k^2$$

$$\lim_{x\to 0}\frac{k\sec^2 kx}{1}=k=2k^2$$

$$0=2k^2-k$$

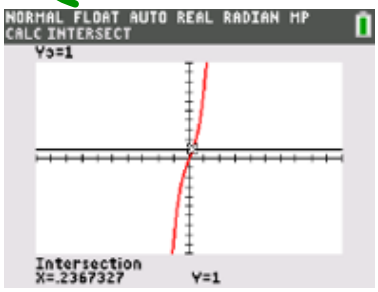
$$=k(2k-1)$$

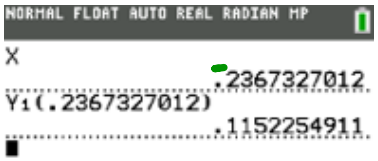
$$k=\cancel{0},\ \frac{1}{2}$$

15. Which of the following is an equation of the line tangent to the graph of $f(x) = x^4 + 2x^2$ at the point where $f'(x) = 1$?

(a) $y = 8x - 5$ (b) $y = x + 7$ (c) $y = x + 0.763$

(d) $y = x - 0.122$ (e) $y = x - 2.146$





$y - b = 1(x - a)$

or

$y = x + b$

$y - .115 = x - .237$

$y = x - .121$

21. $\lim_{x \to +\infty} \sin\left(\frac{\pi x}{2-3x}\right)$

$f(x)$ $g(x)$

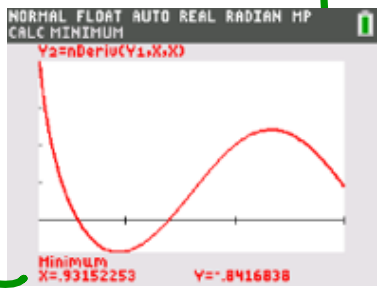
$= \lim_{x \to \infty} \sin\left(\frac{\pi}{-3}\right)$

$= -\frac{\sqrt{3}}{2}$

16. Let f be the function given by $f(x) = \cos(2x) + \ln(3x)$. What is the least value of x at which the graph of f changes concavity?

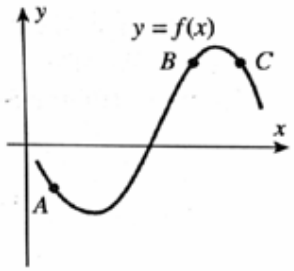
(a) 0.56 (b) 0.93 (c) 1.18 (d) 2.38 (e) 2.44

POI = rel. ext. of f = changes signs of f'



January 16, 2020

31. Use the graph of the equation $y = f(x)$ in the accompanying figure to find the signs of $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at the points A, B, and C.



	A	B
f	−	
f'	−	
f''	+	