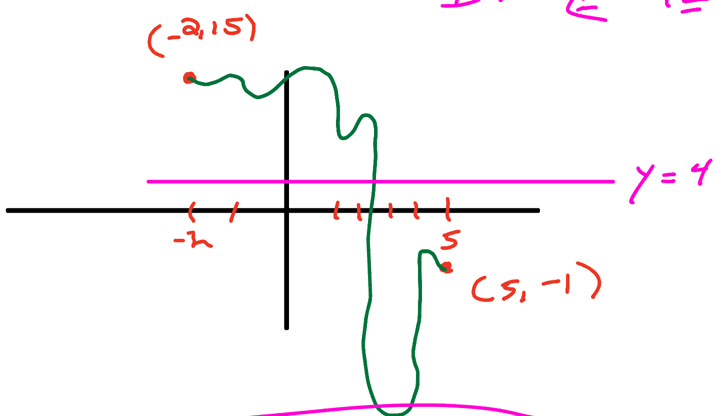
Period 3, 8/30/24

contibious

8. The function $g(x)$ is differentiable function on the interval $[-2,5]$. If $g(-2) = 15$ and $g(5) = -1$, can you conclude that $g(x)$ equals 4? If so, on what interval and how do you know?

IVT ← $-1 \le 4 \le 15$



I can use IVT

6. Select values of the continuous function $f(x)$ are shown below.

x	-2	0	2	4	6	8
$f(x)$	-20	-1	-1	-25	1	5

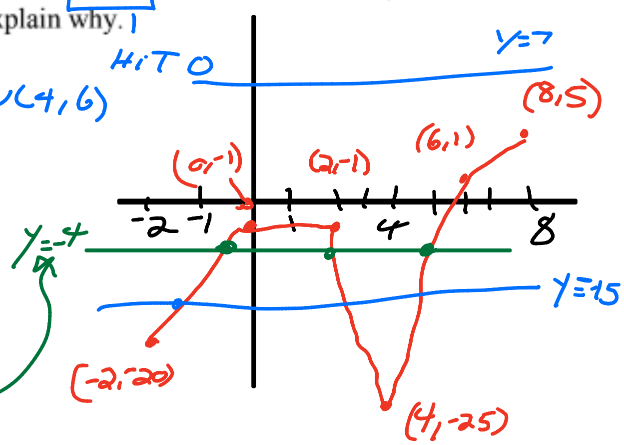
a) For each of the following, conclude if $f(x)$ reaches the selected values and if so, list the interval(s) where it could occur. If not sure, explain why.

i. $f(x) = 0$ $(4,6)$

ii. $f(x) = -15$ $(-2,0) \cup (2,4) \cup (4,6)$

iii. $f(x) = 7$ Nope

HiT 0



b) At least how many times does $f(x) = -4$?

3 Times
IVT
$(-2,0) \cup (2,4) \cup (4,6)$

$$F(x) = \frac{(x+1)(x-1)}{2(x-2)}$$

$x = 2$ asy

$\lim_{x \to 2^-} F(x) = -\infty = \frac{+ \cdot +}{- RSN} = \frac{3 \cdot 1}{- RSN} = -\infty$

$\lim_{x \to 2^+} F(x) = \infty = \frac{+ \cdot +}{+ RSN} = \frac{3 \cdot 1}{+ RSN} = +\infty$

$$h(x) = \frac{1-x}{x^2-4x+3} = \frac{1-x}{(x-3)(x-1)} = \frac{-1\cancel{(x-1)}}{(x-3)\cancel{(x-1)}}$$

Hole at 1

asy at $x=3$

$\lim_{x \to 3^+} h(x) = -\infty$

$\lim_{x \to 3^-} h(x) = +\infty$

$\frac{-1}{(x-3)}$ $x = 3.001$ $\frac{-1}{3.001-3} = \frac{-1}{.001}$

-1000

$\frac{-1}{(x-3)}$ $x = 2.999$ $\frac{-1}{-.001}$

$+1000$

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l) $\lim_{x \to 0} \frac{\sin 3x}{3x^2 + 9x} = \lim_{x \to 0} \frac{\overset{=1}{\sin 3x}}{3x(x+3)} = 1 \cdot \frac{1}{x+3} = \frac{1}{0+3} = \frac{1}{3}$

d) $\lim\limits_{x\to -3} \dfrac{4x^2+17x+15}{x+3}$

$\lim\limits_{x\to 1^-} \dfrac{5x-5}{|x-1|} = \dfrac{5(x-1)}{|x-1|} = \dfrac{5\cdot(.999-1)}{|.999-1|} = \dfrac{5(-.001)}{|-.001|} = \dfrac{5(-)\cancel{.001}}{\cancel{.001}}$

-5

$\dfrac{(\sqrt{x}-\sqrt{3})}{(x-3)} \dfrac{(\sqrt{x}+\sqrt{3})}{(\sqrt{x}+\sqrt{3})} = \dfrac{x+\cancel{\sqrt{3}x}-\cancel{\sqrt{3}x}-3}{(x-3)(\sqrt{x}+3)}$

13) $\lim\limits_{x\to 3} \dfrac{\sqrt{x}-\sqrt{3}}{x-3} =$ ______

$\dfrac{\cancel{x-3}}{(\cancel{x-3})(\sqrt{x}+3)}$

$\lim\limits_{x\to 3} \dfrac{1}{\sqrt{x}+\sqrt{3}} = \dfrac{1}{\sqrt{3}+\sqrt{3}} = \dfrac{1}{2\sqrt{3}}$

$a^2-b^2=(a-b)(a+b)$

$\lim\limits_{x\to 3} \dfrac{\sqrt{x}-\sqrt{3}}{x-3}$

$3=(\sqrt{3})^2$

$x=(\sqrt{x})^2$

$\lim\limits_{x\to 3} \dfrac{\cancel{(\sqrt{x}-\sqrt{3})}}{\cancel{(\sqrt{x}-\sqrt{3})}(\sqrt{x}+\sqrt{3})}$

9) $\lim\limits_{x\to 3} \dfrac{x^3-27}{x^2-9} =$ ______

$$\frac{\cancel{(x-3)}(x^2+3x+3^2)}{\cancel{(x-3)}(x+3)}$$

Form A# ~~38~~, ~~39~~, ~~26~~, ~~47~~, ~~48~~, ~~49~~, 30

Form B# ~~20, 16,~~

Form C# 47, 44, ~~26~~, 29

Form D# 26, 20, 39, 40, 47, 29

$$e^{x+4} = 2$$
$$\ln e^{x+4} = \ln 2$$
$$(x+4)\ln e = \ln 2$$
$$(x+4)\cdot 1 = \ln 2$$
$$x+4 = \ln 2$$
$$x = \ln 2 - 4$$

$$\ln\sqrt{x+3} = 4$$
$$\ln(x+3)^{\frac{1}{2}} = 4$$
$$\cancel{2\cdot}\frac{1}{2}\ln(x+3) = 4\cdot 2$$
$$\ln(x+3) = 8$$
$$e^8 = x+3$$
$$e^8 - 3 = x$$

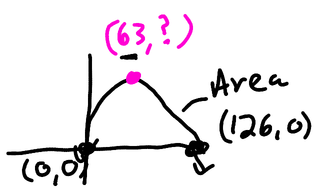
$252 - 2x = 0$

$252 = 2x$

$126 = x$

Vertex $= \dfrac{-b}{2a}$

$= \dfrac{-252}{2\cdot -2} = 63$



$2x + y = 252$

$y = \underline{252 - 2x}$

Area $= xy$

Parabola

Area $= x(252 - 2x) = -2x^2 + 252x$

$63(252 - 2\cdot 63) = 63\cdot 126$

$A = 0$ when $x = 0$ or 126

Area $= 7938$

$$F(x) = 3 - 19x$$

$$F(a) = 3 - 19a$$

$$F(a+h) = 3 - 19(a+h)$$

$$\lim_{h \to 0} \frac{F(a+h) - F(a)}{h}$$

$$\lim_{h \to 0} \frac{[3 - 19(a+h)] - [3 - 19a]}{h}$$

$$\lim_{h \to 0} \frac{\cancel{3} - \cancel{19a} - 19h - \cancel{3} + \cancel{19a}}{h} = \frac{-19\cancel{h}}{\cancel{h}}$$

$$\frac{\csc x \sec x}{\tan x}$$

$$\frac{\frac{1}{\sin x} \cdot \frac{1}{\cos x}}{\frac{\sin x}{\cos x}} = \frac{\frac{1}{\sin x \cos x}}{\frac{\sin x}{\cos x}} = \frac{1}{\sin x \cancel{\cos x}} \cdot \frac{\cancel{\cos x}}{\sin x} = \frac{1}{\sin^2 x} = \csc^2 x$$

$$\cos^2 x (1 + \tan^2 x)$$

$$\cos^2 x \left(\frac{\cos^2 x}{\cos^2 x} + \frac{\sin^2 x}{\cos^2 x} \right) = \cos^2 x \left(\frac{\cos^2 x + \sin^2 x}{\cos^2 x} \right) = \cancel{\cos^2 x} \cdot \frac{1}{\cancel{\cos^2 x}}$$

$$= 1$$

$$\frac{-2x^3 - 4x^2 + 7x + 3}{x+3} = -2x^2 + 2x + 1$$

-3	-2	-4	7	3
		6	-6	-3
	-2	2	1	$\boxed{0}$

$$\frac{F(x+h)-F(x)}{h}$$

$F(x)=9x^2$

$F(x+h)=9(x+h)^2$

$(x+h)^2=(x+h)(x+h)=x^2+2xh+h^2$

$$\frac{9\left[x^2+2xh+h^2\right]-\left[9x^2\right]}{h}=\frac{\cancel{9x^2}+18xh+9h^2\cancel{-9x^2}}{h}$$

$$\frac{\cancel{h}(18x+9h)}{\cancel{h}}=18x+9h$$

$$\frac{5}{x-7}+1=\frac{8}{x-7}$$

$x\neq 7$

$$\frac{5}{x-7}+\frac{x-7}{x-7}=\frac{8}{x-7}$$

$$\cancel{(x-7)}\frac{5+x-7}{\cancel{x-7}}=\frac{8}{\cancel{x-7}}\cancel{(x-7)}$$

$x-2=8$

$+2 \quad +2$

$x=10$

$\underbrace{x^3-6x^2}\underbrace{-x+6}=0$

$x^2(x-6)-1(x-6)=0$

$(x-6)(x-1)(x+1)=0$

$x=6,1,-1$

$$\begin{array}{r|rrrr} \boxed{6} & 1 & -6 & -1 & 6 \\ & & 6 & 0 & -6 \\ \hline & 1 & 0 & -1 & \boxed{0} \end{array}$$

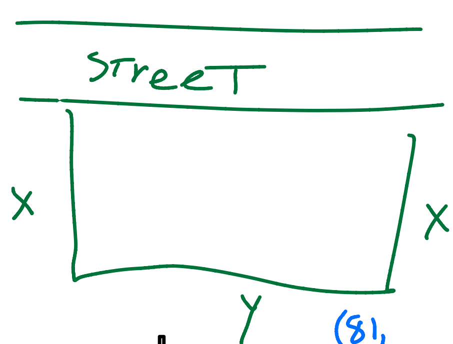
x^2+0x-1

x^2-1

$(x-1)(x+1)$

[redacted]

$$\lim_{x\to -5} \frac{x^2+11x+30}{x+5} = \lim_{x\to -5} \frac{(x+5)(x+6)}{x+5} = -5+6=1$$



$x+y+x=324$

$y+2x=324$

$y=324-2x$

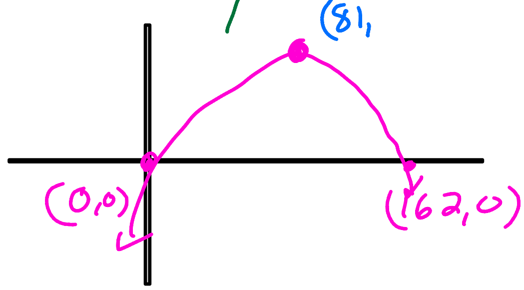
$\text{Area}=x\cdot y$

$=x(324-2x)=-2x^2+324x$

Parabola (opens Down)

Area=0

$x=0$ or $x=162$



$81(324-2(81))$

$81(324-162)$

$81(162)=13\,122$

$x^3+6x^2-x-6=0$

$1+6-1-6=0$

$x=1$ works

$$\begin{array}{r|rrrr} x-1 \quad 1 & 1 & 6 & -1 & -6 \\ & & 1 & 7 & 6 \\ \hline & 1 & 7 & 6 & \boxed{0} \end{array}$$

$1x^2+7x+6$

$(x+6)(x+1)$

$(x-1)(x+6)(x+1)=0$

$x=1,-6,-1$

$\ln(\sqrt{x+3})=6$

$\ln(x+3)^{\frac{1}{2}}=6$

$\cancel{2}\cdot\frac{1}{\cancel{2}}\ln(x+3)=6\cdot 2$

$\ln_e(x+3)=12$

$e^{12}=x+\cancel{3}$

$-3 \qquad -\cancel{3}$

$e^{12}-3=x$

$y=\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

$\sin y=\frac{\sqrt{3}}{2} \qquad \left(-\frac{\pi}{2},\frac{\pi}{2}\right)$

$y=\frac{\pi}{3}$

$$\lim_{h\to 0}\frac{F(x+h)-F(x)}{h}$$

$F(x)=9-22x$

$F(x+h)=9-22(x+h)$

$$\lim_{h\to 0}\frac{[9-22(x+h)]-[9-22x]}{h}=\lim_{h\to 0}\frac{\cancel{9}-\cancel{22x}-22h-\cancel{9}+\cancel{22x}}{h}=\frac{-22\cancel{h}}{\cancel{h}}$$

$=-22$

$y=(x-8)^3$ inverse $\sqrt[3]{x}=\sqrt[3]{(y-8)^3}$

$\sqrt[3]{x}=y-\cancel{8}$
$+8 \quad +8$

$\sqrt[3]{x}+8=y$

$F(x)=\underbrace{(x+1)(x+2)}(x+4)^2$

$(x^2+3x+2)(x^2+8x+16)=1x^4$