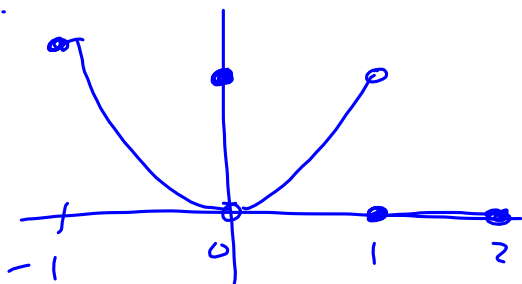


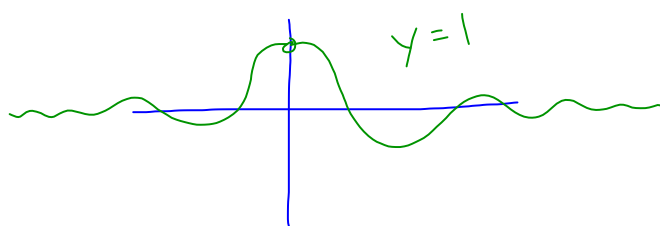
23.



$$x = 0, 1$$

27.

$$f(x) = \begin{cases} \frac{\sin x}{x} & x \neq 0 \\ 1 & \underline{\underline{x = 0}} \end{cases}$$



25.

$$y = \frac{(x^2 - 9)}{x + 3} \quad x = -3$$

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

$$y = x - 3$$

33.

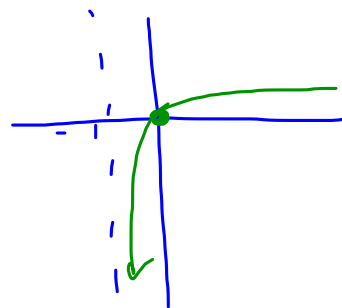
$$f(g(x)) = \sqrt{\left(\frac{x}{x+1}\right)}$$

$$f(x) = \sqrt{x}$$

$$x \geq 0$$

$$g(x) = \frac{x}{x+1}$$

$$x \neq -1$$



$$f(x) = \begin{cases} 2x & 0 < x < 1 \\ 1 & x = 1 \\ -x + 3 & 1 < x < 2 \end{cases}$$

$$[-1, 3)$$

except  $x = 0, 1, 2$

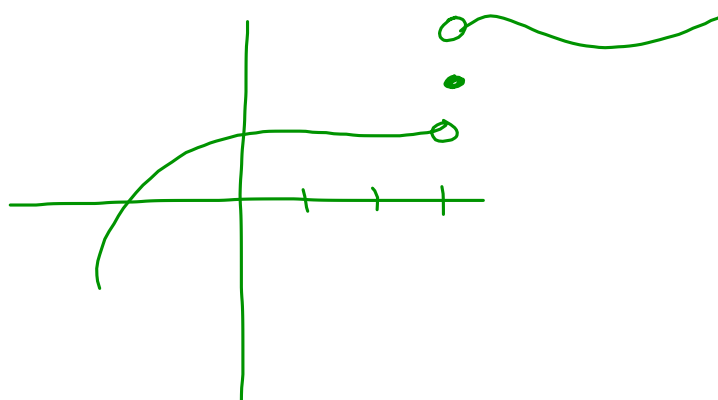
47.

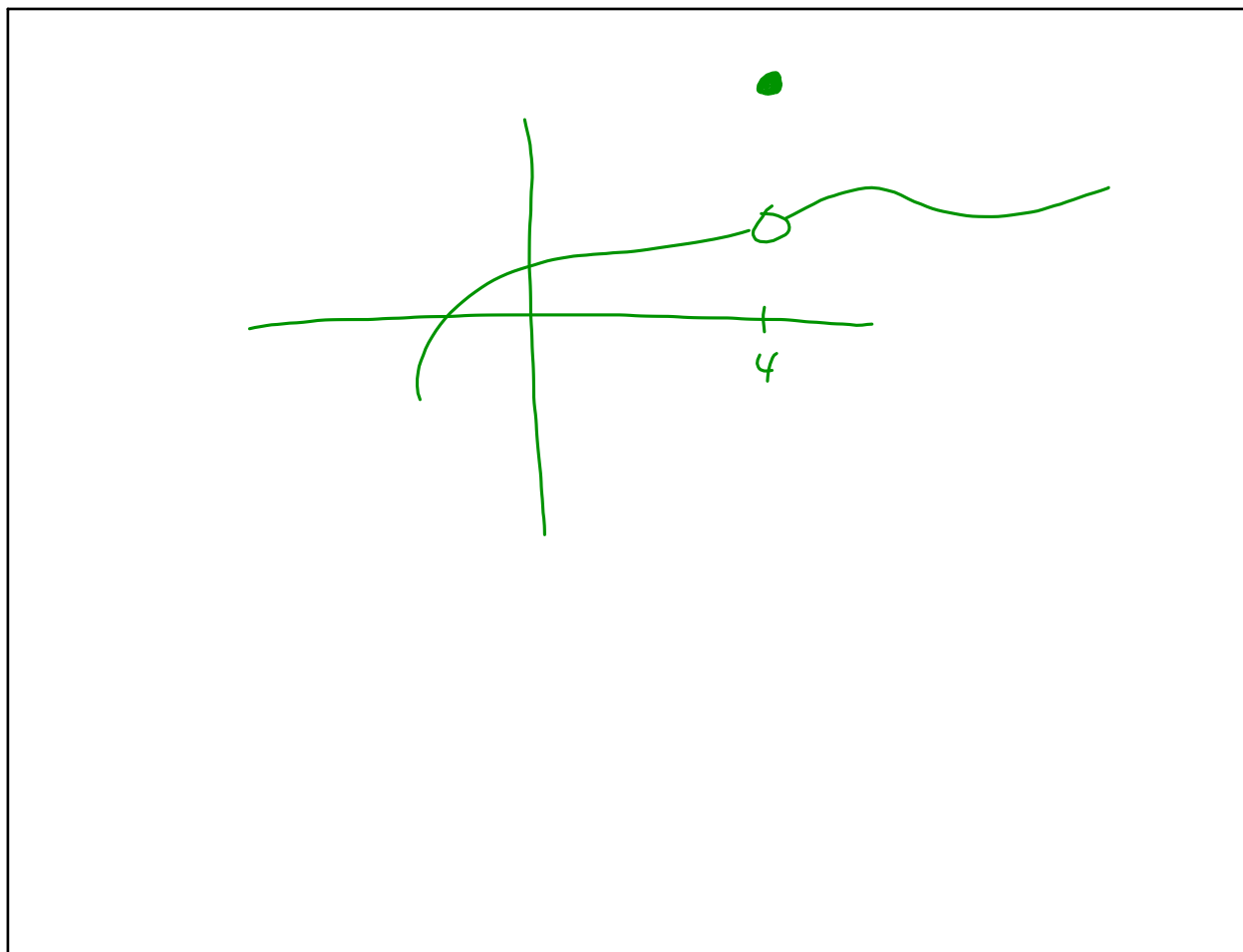
$$f(x) = \begin{cases} x^2 - 1 & x < 3 \\ 2ax & x \geq 3 \end{cases}$$

$$2a(3) = 8$$

$$a = \frac{8}{6} = \frac{4}{3}$$

41.





Avg. Rate Change  $2x^3$

\* 2 pts.  $(2, 16)$   $(1, 2)$   
 $(4, 128)$   $(3, 54)$

$$\frac{128-16}{4-2}$$

$$\frac{54-2}{3-1}$$

Instantaneous  
Slope of Tangent  
Exact

$$\lim_{h \rightarrow 0} \frac{f(\underline{3+h}) - \underline{f(3)}}{h} \quad \begin{array}{l} x=4 \\ x=3 \end{array}$$

$$\underline{x^2 - 3x}$$

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

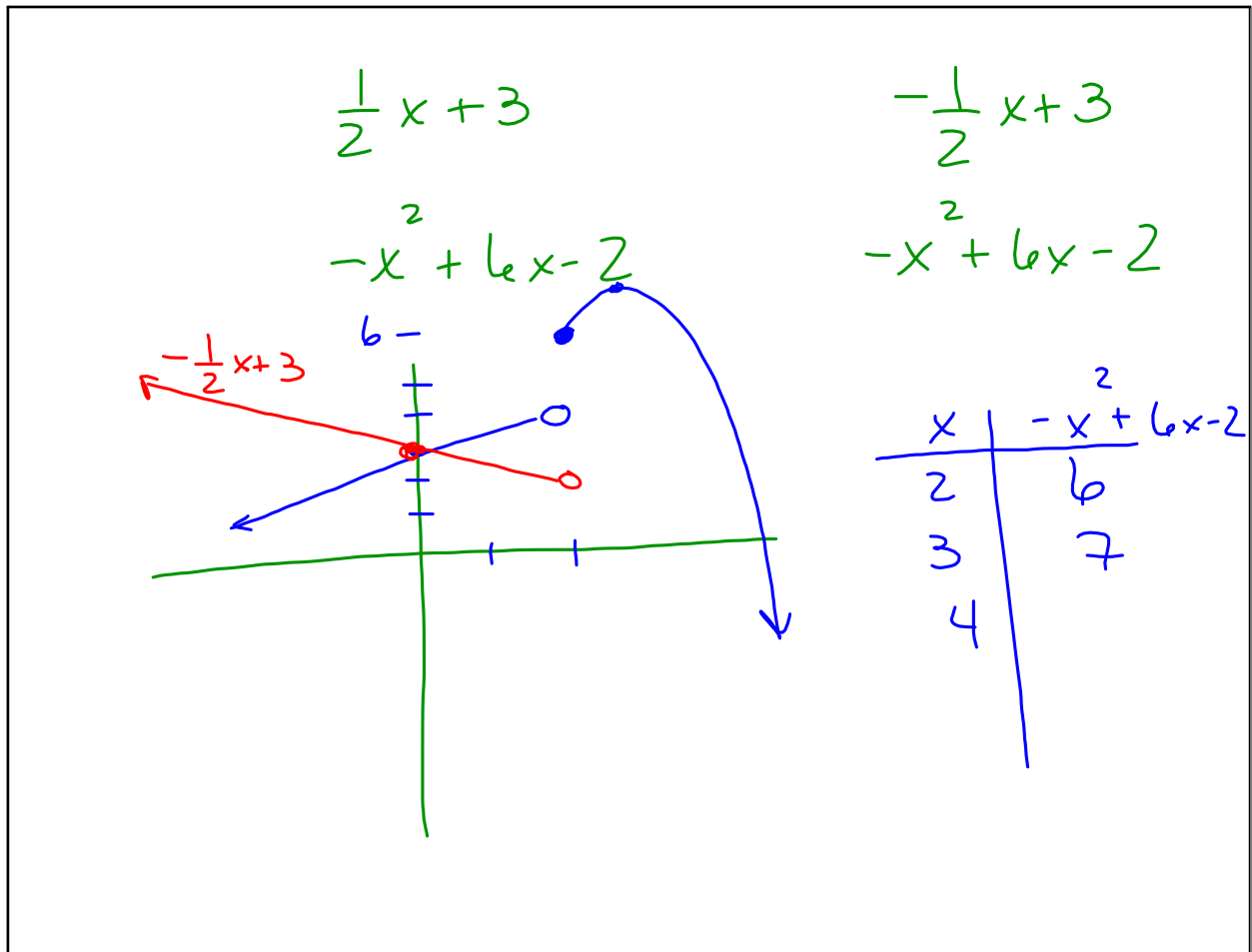
$$\frac{\cancel{9} + 6h + \cancel{h^2} - \cancel{9} - 3h - \cancel{9} + \cancel{9}}{h}$$

$$\lim_{h \rightarrow 0} \frac{3h + h^2}{h} = 3 + h = 3$$

$$\lim_{h \rightarrow 0} \frac{(4+h)^2 - 3(4+h) - (4^2 - 3(4))}{h}$$

$$\frac{\cancel{16} + 8h + \cancel{h^2} - \cancel{12} - 3h - \cancel{16} + \cancel{12}}{h}$$

$$\lim_{h \rightarrow 0} \frac{5h + h^2}{h} = 5 + h = 5$$



$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{4x} = \frac{1}{2} \left( \frac{\sin(2x)}{2x} \right) = \frac{1}{2}$$

$$\frac{\sin 3x}{5x} = \frac{3}{5} \cdot \left( \frac{\sin 3x}{3x} \right) = \frac{3}{5}$$

$$\frac{\sin 7x}{2x} = \frac{7}{2} \left( \frac{\sin 7x}{7x} \right) = \frac{7}{2}$$

$$\left( \frac{7}{2} \right) \left( \frac{\sin 7x}{7x} \right)$$

$$7. \lim_{x \rightarrow \pm\infty} \frac{x^4}{12x^3}$$

$$\frac{x}{12} = \frac{1}{12}x$$

Aug. Slope  $f(x) = 2x^3$

2 pts.

$[2, 4]$

$[1, 3]$

$(2, 16)$

$(1, 2)$

$(4, 128)$

$(3, 54)$

Instantaneous

Exact

Slope of Tangent

$$\underline{\underline{x^2 - 3x}}$$

$$\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$$

@ x = 3

x = 4

$$\lim_{h \rightarrow 0} \frac{(3+h)^2 - 3(3+h) - ((3)^2 - 3(3))}{h}$$

$$\lim_{h \rightarrow 0} \frac{\cancel{9} + 6h + h^2 - \cancel{9} - 3h - \cancel{9} + \cancel{9}}{h}$$

$$\lim_{h \rightarrow 0} \frac{3h + h^2}{h} = 3 + h = 3$$

$$\lim_{h \rightarrow 0} \frac{(4+h)^2 - 3(4+h) - ((4)^2 - 3(4))}{h}$$

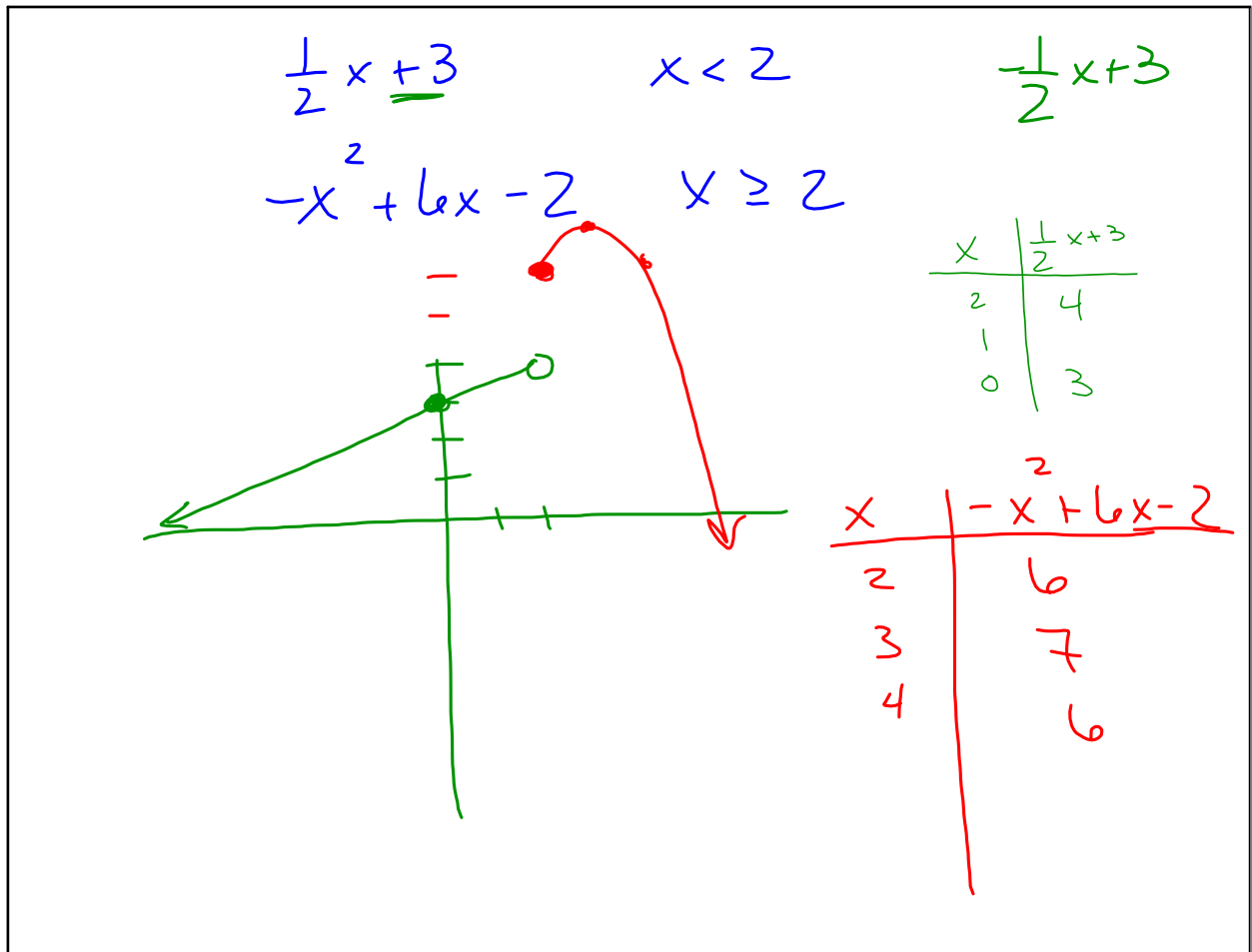
$$\lim_{h \rightarrow 0} \frac{\cancel{16} + 8h + h^2 - \cancel{12} - 3h - \cancel{16} + \cancel{12}}{h}$$

$$\lim_{h \rightarrow 0} \frac{5h + h^2}{h} = 5 + h = \textcircled{5}$$

pt (4, 4)

$$y = 5(x-4) + 4$$





$\frac{x}{x-1}$        $x < 1$   
 $x \geq 1$

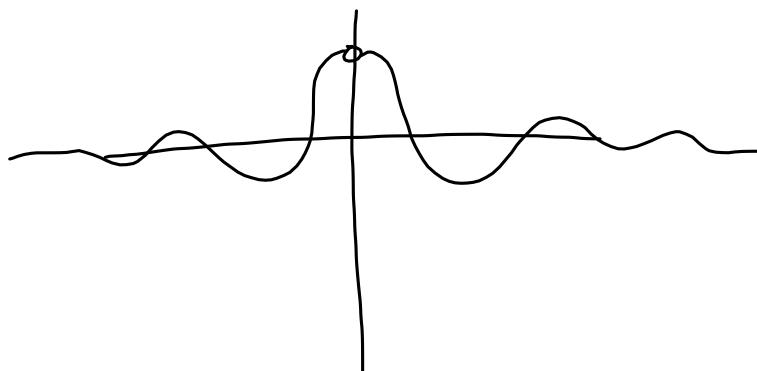
$$25. \quad f(x) = \frac{x^2 - 9}{x + 3} = \frac{\cancel{(x+3)}(x-3)}{\cancel{x+3}} = \textcircled{x-3}$$

$$y = \underline{x-3}$$

27.

$$f(x) = \frac{\sin x}{x}$$

$$f(x) = \begin{cases} \frac{\sin x}{x} & x \neq 0 \\ 1 & x = 0 \end{cases}$$



$$57. \quad f(x) = \sqrt{x-1} \quad x \geq 1$$

$$56. \quad \frac{1}{\sqrt{x}} \quad \text{not cont.}$$

- or 0

$$\text{Cont.} \quad x > 0$$

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

$$\frac{x-2}{x-3}$$

47.

$$f(x) = \begin{cases} x^2 - 1 & x < 3 \\ 2ax & x \geq 3 \end{cases}$$

$$8 = 6a$$

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{4x} = \frac{1}{2} \left( \frac{\sin 2x}{2x} \right)$$

$$\frac{\sin 2x}{2x}$$