

Exam #2 old ones

- #1.
- | | |
|-------|--------|
| a) -3 | e) 1 |
| b) -1 | f) DNE |
| c) -3 | g) DNE |
| d) 1 | h) DNE |

#2

$$\lim_{x \rightarrow 3} \frac{(x+1)^2 - 16}{x-3} \rightarrow \frac{(3+1)^2 - 16}{3-3} = \frac{0}{0}$$

$$= \lim_{x \rightarrow 3} \frac{x^2 + 2x + 1 - 16}{x-3} = \lim_{x \rightarrow 3} \frac{x^2 + 2x - 15}{x-3} = \lim_{x \rightarrow 3} \frac{\cancel{(x-3)}(x+5)}{\cancel{x-3}}$$

$$= \lim_{x \rightarrow 3} x+5 = 3+5 = 8$$

- #3
- | | |
|----------|------|
| <u>a</u> | DNE |
| <u>b</u> | -8/2 |
| <u>c</u> | 0 |
| <u>d</u> | 7 |

#4

$$f(x) = \frac{x^2 - x - 6}{2x^2 - 6x} = \frac{(x-3)(x+2)}{2x(x-3)}$$

a $x=0$, $x=3$ are discontinuity points

$$b \quad \lim_{x \rightarrow 0} \frac{(x-3)(x+2)}{2x(x-3)} = \lim_{x \rightarrow 0} \frac{x+2}{2x} = \frac{0+2}{0} \quad \underline{\text{DNE}}$$

$$\lim_{x \rightarrow 3} \frac{(x-3)(x+2)}{2x(x-3)} = \lim_{x \rightarrow 3} \frac{x+2}{2x} = \boxed{\frac{5}{6}}$$

5

$$f(x) = \begin{cases} 10x & \text{if } x \leq 5 \\ 50 + 8(x-5) & \text{if } x > 5 \end{cases}$$

6

$$\frac{f(3) - f(-1)}{3 - (-1)} = \frac{\frac{3+1}{3^{-1}} - \frac{-1+1}{-1^{-1}}}{3+1} = \frac{\frac{4}{2} - \frac{0}{-2}}{4}$$

$$= \frac{2-0}{4} = \frac{1}{2}$$

7

$$f(x) = 2x^2 - x$$

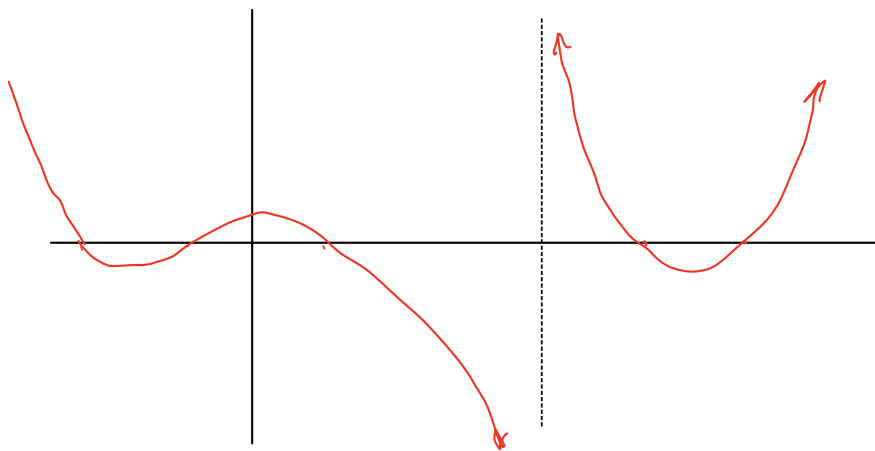
$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{2(x+h)^2 - (x+h) - (2x^2 - x)}{h}$$

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

$$= \lim_{h \rightarrow 0} \frac{2(x^2 + 2xh + h^2) - h - 2x^2}{h} = \lim_{h \rightarrow 0} \frac{\cancel{2x^2} + 4xh + 2h^2 - h - \cancel{2x^2}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{h}(4x + 2h - 1)}{\cancel{h}} = \lim_{h \rightarrow 0} 4x + 2h - 1 = \underline{\underline{4x - 1}}$$

8



9

$$f(t) = 32 + 2t + t^2$$

a $f(5) = 32 + 2 \cdot 5 + 5^2 = 32 + 10 + 25 = 67$

In week 5, my grade is 67%.

b $f'(t) = 2 + 2t$

$$f'(5) = 2 + 2 \cdot 5 = 12$$

In week 5, my grade is increasing by 12 points per week.

10

a $8x - 2$

b $1 + 3 \cdot \frac{1}{2}x^{-1/2} - 6x^5$

c $7 + -1x^{-2} + -15x^{-4}$