

Exam 2 old ones

1.

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

2.

$$\lim_{x \rightarrow 3} \frac{x^2 - x - 6}{2x^2 - 6x}$$

plug in: $\frac{3^2 - 3 - 6}{2 \cdot 3^2 - 6 \cdot 3} = \frac{9 - 3 - 6}{2 \cdot 9 - 18} = \frac{0}{0}$

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

3.

- | | |
|--------|----------------------|
| a) DNE | b) $-8h = -4$ |
| c) 0 | d) $\frac{7}{1} = 7$ |

4.

$$f(x) = \frac{x^2 - 7x + 10}{x^2 - 5x} = \frac{(x-5)(x-2)}{x(x-5)}$$

a) denom = 0 when $x=0$ & $x=5$

b) $\lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0} \frac{(x-5)(x-2)}{x(x-5)} = \lim_{x \rightarrow 0} \frac{x-2}{x} = \frac{-2}{0} \quad \boxed{\text{DNE}}$

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

#5 plug in 0: $3 \cdot 0 + 1 = 1$ & if B continuous at $x=0$
 $1 - 0 + 0^2 = 1$

plug in 2: $1 - 2 + 2^2 = 3$ so it's not continuous at $x=2$.
 $3 \cdot 2 = 6$

a) $x=2$ is a discontinuity

b) $\lim_{x \rightarrow 2^-} f(x) = 3$ $\lim_{x \rightarrow 2^+} f(x) = 6$

#6
$$\frac{g(1) - g(-1)}{1 - (-1)} = \frac{3 \cdot 1^2 - 2 \cdot 1 - (3 \cdot (-1)^2 - 2 \cdot (-1))}{2}$$

$$= \frac{3 - 2 - (3 + 2)}{2} = \frac{1 - 5}{2} = \frac{-4}{2} = \boxed{-2}$$

#7 $f(x) = x^2 + 3x$, find $f'(2)$

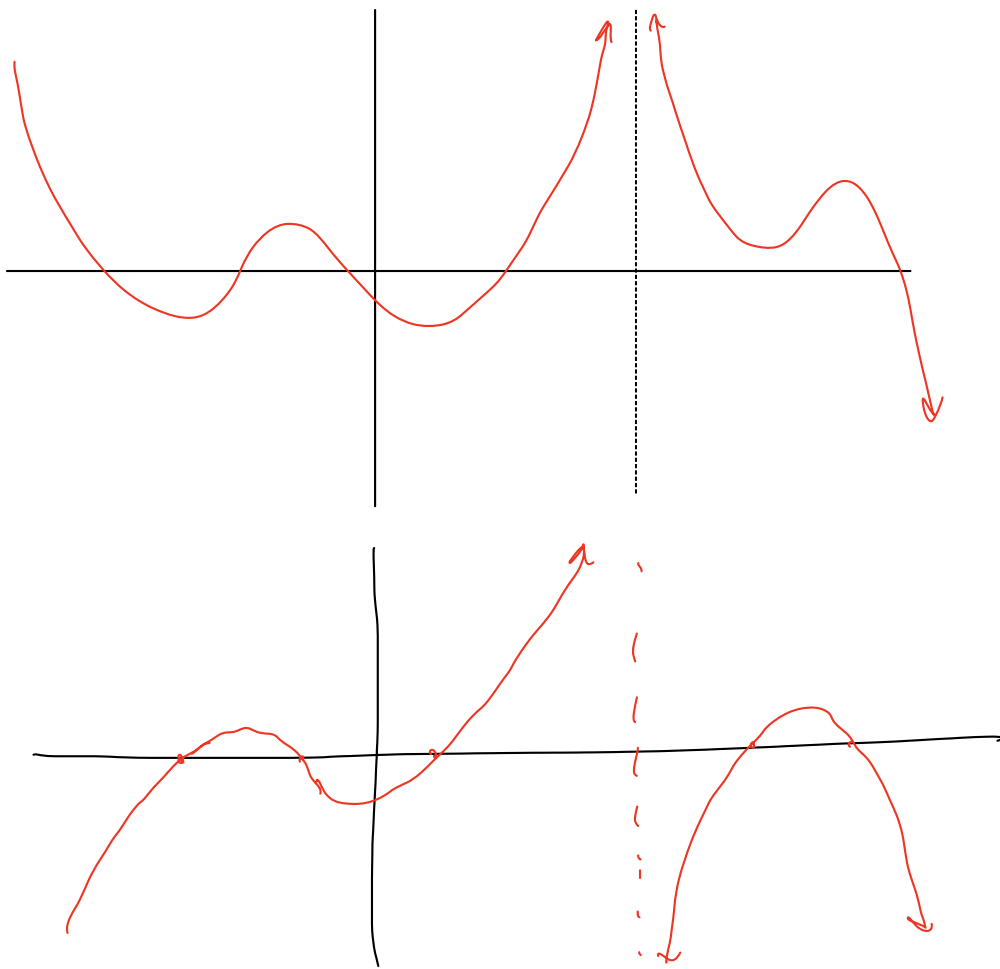
$$f'(2) = \lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} = \lim_{h \rightarrow 0} \frac{(2+h)^2 + 3(2+h) - (2^2 + 3 \cdot 2)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{(2+h)(2+h) + 6 + 3h - (4+6)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{4} + 4h + h^2 + \cancel{6} + 3h - \cancel{4} - \cancel{6}}{h} = \lim_{h \rightarrow 0} \frac{7h + h^2}{h} = \lim_{h \rightarrow 0} \frac{\cancel{h}(7+h)}{\cancel{h}}$$

$$= \lim_{h \rightarrow 0} 7+h = \boxed{7}$$

#8



#9

$$\begin{aligned} a) \quad v(2) &= 500 + .5 \cdot 2 + 2^2 \\ &= 500 + 1 + 4 = 505. \end{aligned}$$

At year 2, my investment value is \$505.

$$b) \quad v'(t) = .5 + 2t$$

$$v'(2) = .5 + 2 \cdot 2 = 4.5$$

At year 2, my investment is growing at a rate of 4.5 \$/year

#10

a) $8x - 24x^2$

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

c) $-10x^{-3} + 7$