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Office: South Hall, 6431 V

OH: M 11-12pm / ML: Th 1-3pm

3A: Week 3 Exam 1 Practice Worksheet

Name:

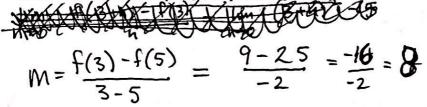
"A recall is worth a thousand repetitions"
-Dr. Wayne Iba

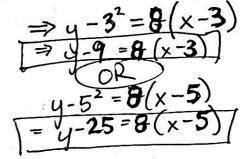
Collaborators:

Section Day/Time:

## Exam 1 Practice Worksheet

1. Find an equation of the line that passes through the points on the graph  $f(x) = x^2$  when x = 3 and x = 5. Write the equation in point-slope form.





2. The point (5,1) is on the graph of  $f(x) = \sqrt{x-4}$ .

a) Compute the slope of the secant line through (5,1) and the point that is on the graph of f(x) at x = 5.01.

$$M = \frac{f(5.01) - f(5)}{5.01 - 5} = \frac{\sqrt{5.01 - 4} - 1}{0.01} = \boxed{0.4987}$$

b) Use this answer to guess the slope of the tangent line to f(x) at the point (5,1).

3. Evaluate the limit  $\lim_{h\to 0} \frac{\sqrt{1+h}-1}{h}$ .

$$\lim_{h \to 0} \frac{\sqrt{1+h} - 1}{h} = \lim_{h \to 0} \frac{\sqrt{1+h} - 1}{h} \cdot \frac{\sqrt{1+h} + 1}{\sqrt{1+h} + 1}$$

$$= \lim_{h \to 0} \frac{(1+h) - 1^2}{h(\sqrt{1+h} + 1)} = \lim_{h \to 0} \frac{h}{h(\sqrt{1+h} + 1)}$$

$$= \lim_{h \to 0} \frac{1}{\sqrt{1+h} + 1} = \frac{1}{\sqrt{1+1}} = \boxed{\frac{1}{2}}$$

$$= 1$$

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4. Find and sketch all asymptotes (vertical and horizontal) of the graph  $f(x) = \frac{3x^2+1}{x^2-4}$ .

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

$$f(x) = \frac{3x^2 + 1}{(x - 2)(x + 2)} \implies V. A. \text{ at } x = 2, x = -2 \implies \lim_{x \to 2} f(x) \approx \frac{1}{x^2 - 4} = \infty$$

$$|A| = \lim_{x \to \infty} \frac{3x^2 + 1}{x^2 - 4} = \lim_{x \to \infty} \frac{3 + \frac{1}{x^2}}{1 - \frac{1}{x^2}} = 3$$

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$$\Rightarrow \lim_{x \to 2^{+}} f(x) \approx \frac{+}{+\cdot +} = \infty$$

$$\Rightarrow \lim_{x \to -2^{-}} f(x) \approx \frac{+}{+\cdot +} = \infty$$

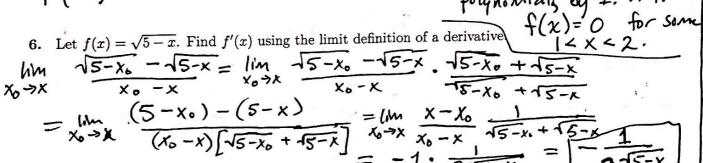
$$\Rightarrow \lim_{x \to -2^{+}} f(x) \approx \frac{+}{-\cdot +} = \infty$$
See Sketch below

5. Use the Intermediate Value Theorem to show that the function  $f(x) = x^4 + x - 9$  has a root

on the open interval (1,2). (Note: You do not need to actually find a root.)

$$f(1) = 1^4 + 1 - 9 = -7 < 0$$
 $f(2) = 2^4 + 2 - 9 = 16 + 2 - 9 = 9 > 0$ 

and since f is a polynomial, by I. V. T.



7. Use the given graph of the function f(x) below to sketch the graph of f'(x) on the axes.

