

**Test #1 (Part 1 – No Calculator)**

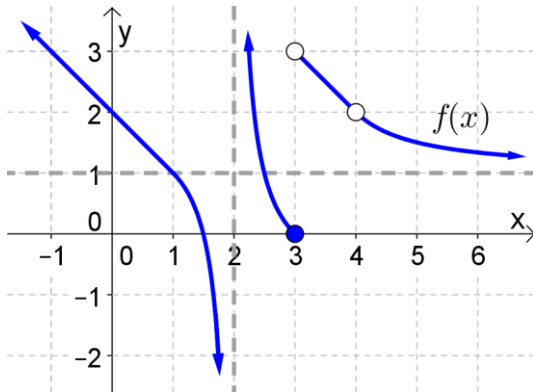
Name: \_\_\_\_\_

Math 180, Prof. Beydler

Wednesday, September 26, 2018

**Directions:** Show all work. No calculator, books, or notes. Your desk and lap must be clear (no phones, no smart watches, etc.). If you have a phone in your lap or on your chair, it is considered cheating, and you will receive a zero on this test. Write your answers in the indicated places, or box your answers. When you're finished with Part 1, please turn it in, take a bathroom break, get your calculator out, and start Part 2. Good luck!

1. (4 points) Find the following limits for the below graph of  $f(x)$ .



$$\lim_{x \rightarrow 3^-} f(x)$$

$$\lim_{x \rightarrow 3^+} f(x)$$

$$\lim_{x \rightarrow 3} f(x)$$

$$\lim_{x \rightarrow 2^+} f(x)$$

$$\lim_{x \rightarrow -1} f(x)$$

$$\lim_{x \rightarrow 4} f(x)$$

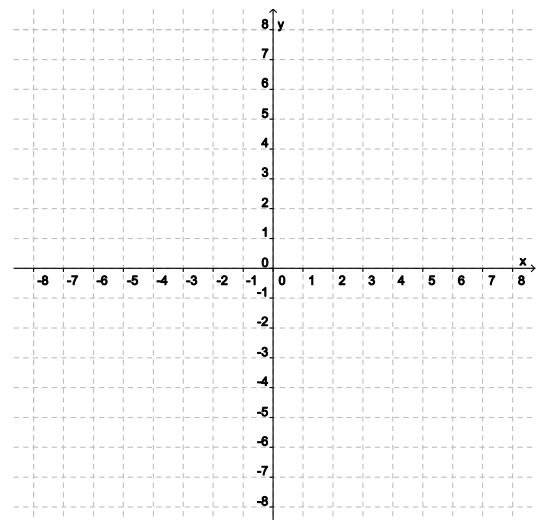
$$\lim_{x \rightarrow -\infty} f(x)$$

$$\lim_{x \rightarrow \infty} f(x)$$

2. (3 points) Using the graph of  $f(x)$  from the previous question, answer the following. No need to give reasons here.

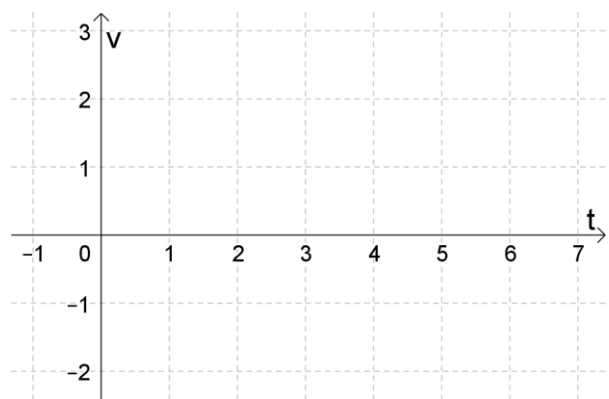
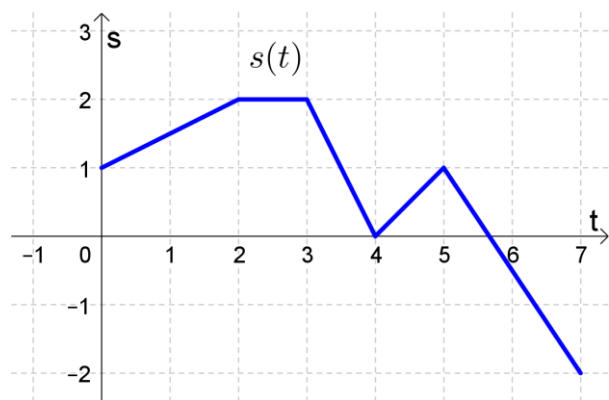
- a) Is  $f$  continuous or discontinuous at  $x = 4$ ?    continuous    discontinuous    (circle one)
- b) Is  $f$  continuous from the left at  $x = 3$ ?    yes    no    (circle one)
- c) Is  $f$  continuous from the right at  $x = 2$ ?    yes    no    (circle one)
- d) Is  $f$  differentiable at  $x = 4$ ?    yes    no    (circle one)
- e) Find  $f'(3.5)$ . Answer: \_\_\_\_\_
- f) Find  $f'(3)$ . Answer: \_\_\_\_\_

3. (2 points) Sketch the graph of an example of a function  $f$  that satisfies  $\lim_{x \rightarrow -\infty} f(x) = -5$ ,  $\lim_{x \rightarrow 5^+} f(x) = \infty$ , discontinuous from the right at  $x = -2$ , and  $f(2) = 3$ . Be sure to draw any asymptotes of  $f$ .



4. (3 points) Use the Squeeze Theorem to prove that  $\lim_{x \rightarrow 0} x^2 \cos\left(\frac{1}{x}\right) = 0$ .

5. (2 points) Suppose you move back and forth along a line, and that your position over time is given by the function  $s(t)$  below. Graph the velocity function  $v(t)$ .



6. Differentiate the following functions.

a) (3 points)  $f(x) = 4^x + \frac{3}{\sqrt[4]{x}} + 2e^4 + 5 \ln x + \cot x + 2 \cos^{-1} x$

Answer: \_\_\_\_\_

b) (3 points)  $f(x) = \frac{x^3 + \cosh x}{\sin x}$  (for this one, don't worry about simplifying your answer)

Answer: \_\_\_\_\_

c) (4 points)  $f(x) = \frac{\csc x}{x^3 e^x}$  (for this one, don't worry about simplifying your answer)

Answer: \_\_\_\_\_

d) (3 points)  $f(x) = \cos^2(2^x)$  (for this one, don't worry about simplifying your answer)

Answer: \_\_\_\_\_

e) (3 points)  $f(x) = \sqrt{\ln(\sec x)}$  (for this one, don't worry about simplifying your answer)

Answer: \_\_\_\_\_