_____ / 54 total points

Test #1

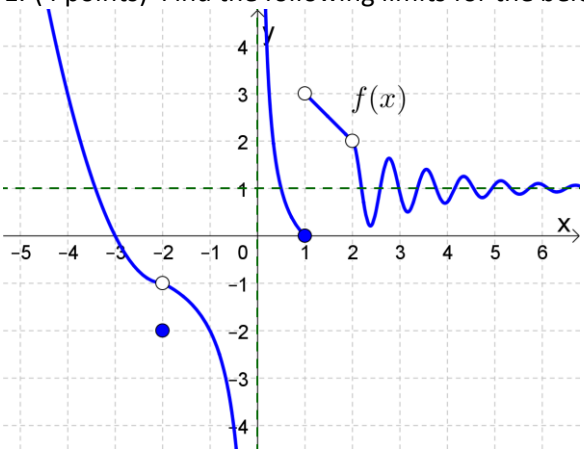
Name: _____

Math 180, Section 7, Prof. Beydler

Thursday, September 28, 2017

Directions: Show all work. No books or notes. A **scientific calculator** is allowed. 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. Good luck!

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



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

$\lim_{x\to 1^-} f(x)$ $\lim_{x\to 0} f(x)$ $\lim_{x\to -1} f(x)$

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

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 $x = 2$? continuous discontinuous (circle one)

   b) Is f continuous from the left at $x = 1$? yes no (circle one)

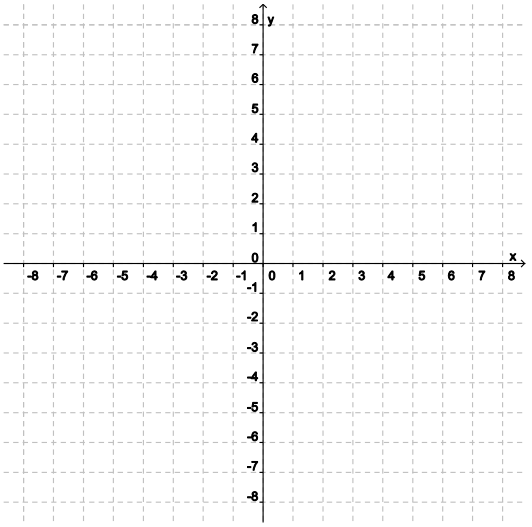
   c) Is f continuous from the right at $x = 2$? yes no (circle one)

   d) Is f differentiable at $x = -3$? yes no (circle one)

   e) Find $f'(1.5)$. Answer: _____

   f) Find $f'(-2)$. Answer: _____

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



4. Find the following limits.

a) (2 points) $\lim_{x\to 2} \frac{3x^2-5x-2}{x^2+7x-18}$

Answer: _____

b) (2 points) $\lim_{x\to 3^-} \frac{(x-5)(2x+1)}{3-x}$

Answer: _____

c) (2 points) $\lim_{x\to \infty} \frac{\sqrt{3x^2+1}}{2x-1}$

Answer: _____

d) (2 points) $\lim_{x\to 9^-} \ln\left|\sqrt{x}-3\right|$

Answer: _____

e) (2 points) $\lim_{x\to -\infty} \left(\sqrt{x^2+1}-x\right)$

Answer: _____

5. (3 points) Use the Squeeze Theorem to prove that $\lim_{x\to 0} x^4 \sin\left(\frac{1}{x}\right) = 0$.

6. (2 points) Find the value of c such that $f(x) = \begin{cases} 2+\sqrt{x} & \text{if } 0 \le x \le 1 \\ \ln cx & \text{if } x > 1 \end{cases}$ is continuous on $[0, \infty)$

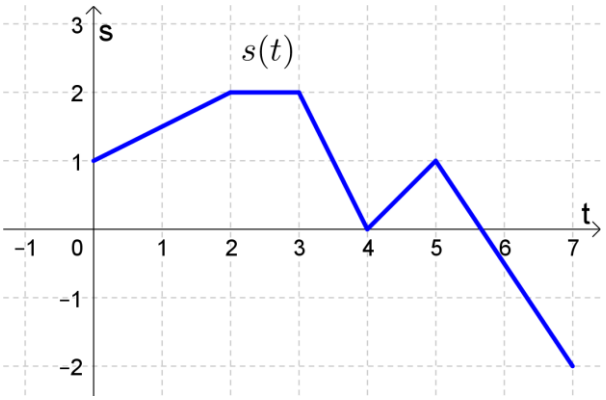
$c =$_____

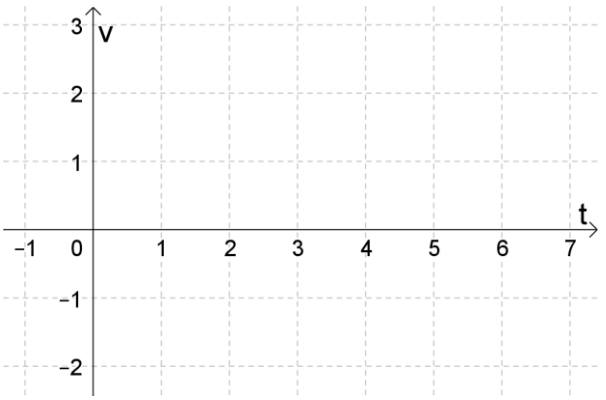
7. (3 points) Use the Intermediate Value Theorem to show that there is a root of $3 - 2x = e^x$ in the interval $(0, 1)$.

8. (4 points) Find the derivative of $f(x) = \sqrt{2x+1}$ using the limit definition.

Answer: _____

9. (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 $v(t)$.





10. Differentiate the following functions.

a) (3 points) $f(x) = 2e^x + \sqrt[3]{x} + \pi^2 - 2\log_3 x + 4\tan x + \cos^{-1} x$

Answer: _____

b) (3 points) $f(x) = \frac{\sec x}{x^2 + \sin x}$ (for this one, don't worry about simplifying your answer)

Answer: _____

c) (4 points) $f(x) = \frac{x^3 \sinh x}{2^x}$ (for this one, don't worry about simplifying your answer)

Answer: _____

d) (3 points) $f(x) = \tan^{-1}(\ln 3x)$ (for this one, don't worry about simplifying your answer)

Answer: _____

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

Answer: _____

11. (3 points) Find an equation for the tangent line to $y = (5x^2 + 2)e^x$ at the point $(0, 2)$.

Answer: _____

12. (2 points) Find the second derivative of $y = \cot 3x$.

Answer: _____

Note: Be sure to double check your work. And remember to turn in your homework and extra credit! ☺