Exam 1 Study Guide

Name______________________________

Answer the questions in the spaces provided. Feel free to use another piece of paper for your work

1. Find the limit, if it exist:
   Remember, to show $\lim_{x\to a} f(x)$ *exist you have to show* $\lim_{x\to a^-} f(x) = \lim_{x\to a^+} f(x)$

   (a) $\lim_{x\to 0} \frac{1}{\sqrt{\frac{1}{x}}}$

   $\lim_{x\to 5} \frac{x+4}{x^2+3x+9}$

   (b) $\lim_{t\to 1} \frac{1}{t^2-1}$

   $\lim_{x\to\infty} \cos\left(\frac{1}{x}\right)$

   (c) $\lim_{s\to 0} \frac{4}{1+2^{1/x}}$

   $\lim_{h\to\infty} \frac{(3+h)^5-243}{h}$

   (d) $\lim_{s\to\infty} \frac{4}{1+2^{1/x}}$

   $\lim_{h\to 0} \frac{(3+h)^5-243}{h}$

2. Apply the Squeeze Theorem:
   Remember, the Squeeze Thrm says-
   If $f \leq g \leq h$ *and* $\lim_{x\to a} f = L = \lim_{x\to a} h$, *then* $\lim_{x\to a} g = L$

   (a) $\lim_{x\to 0} \frac{4}{x-4}\cos\left(\frac{1}{x}\right)$ $\qquad$ $\lim_{x\to\infty} \frac{4}{x-4}\sin(x)$

   (b) $\lim_{x\to 3} \frac{x+3}{x^2-9} e^{\sin\left(\frac{1}{x-3}\right)}$ $\qquad$ $\lim_{x\to -1} \frac{1}{x^2-1}\left|\cos\left(\frac{1}{x+1}\right)\right| - 3x$

   (c) $\lim_{\theta\to\infty} \frac{6\cos^2(\theta)}{\tan(1/\theta)-4}$ $\qquad$ $\lim_{x\to 5}(x^2-5x+6)(\frac{1}{x+5}+\frac{1}{x^2-1})$

3. Use the properties of limits(Limit Laws) to solve:

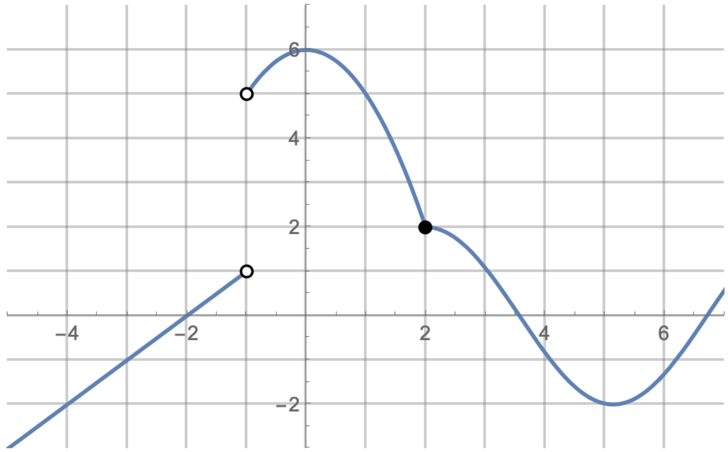
(a) $\lim_{x\to 8}(1+\sqrt[3]{x})\left(4-6x^2+x^3\right)$

$\lim_{x\to 2}\sqrt{\frac{2x^2+1}{3x-2}}$

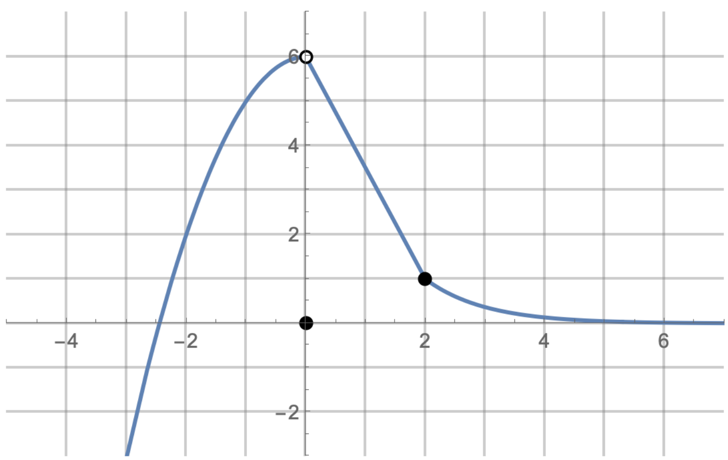
(b) $\lim_{t\to 2}\frac{t^4-9}{2t^2-3t+6}$

$\lim_{x\to 3} 3x^3-5x^2+x-8$

4. Use the graphs to answer the following questions:



(a) $\lim_{x\to -1^-} f(x)$ $\lim_{x\to -1^+} f(x)$ $\lim_{x\to 2} f(x)$



(a) $\lim_{x\to 0} g(x)$ $\lim_{x\to 2^-} g(x)$ $\lim_{x\to 2^+} g(x)$

5. Find the limits given the following functions:

$$f(x) = x^2 - 25 \qquad g(x) = \frac{4}{x^2-2} \qquad h(x) = 5 + x$$

(a) $\lim_{x\to\sqrt{6}} f(x) + g(x)$ $\qquad$ $\lim_{x\to -5} \frac{h(x)}{f(x)}$

(b) $\lim_{x\to 0}(g \circ h)(x)$ $\qquad$ $\lim_{x\to -5}(f \circ h)(x)$

6. Find the limit, if it exist:

(a) $\lim_{x\to 0}(6x + |x-5|)$ $\qquad$ $\lim_{x\to 0}(3x+1)(2x - \frac{1}{3x^2-2x-1})$

(b) $\lim_{x\to 3}\left|\frac{3}{x^2-9}\right|$ $\qquad$ $\lim_{x\to 5}(x^2-5x+6)(\frac{1}{x-3} - \frac{1}{x-2})$

7. State the definition of a continuous function.

8. State the limit laws/rules.

9. True of false: If $f(x)$ is a polynomial, $\lim_{x \to a} f(x) \neq f(a)$. If false state the correct definition.

10. What is required for $\lim_{x \to a}(f \circ g)(x) = f(g(a))$ to be true?

11. State the, "Intermediate Value Theorem."

12. Find the flaw and correct it:

$$\lim_{t\to 0} \frac{t^2}{\sqrt{t^2+9}-3} =$$

$$\frac{\lim_{t\to 0} t^2}{\lim_{t\to 0} \sqrt{t^2+9}-3} =$$

$$\frac{0}{0} = DNE$$