Name:_____ **9/29/2016**

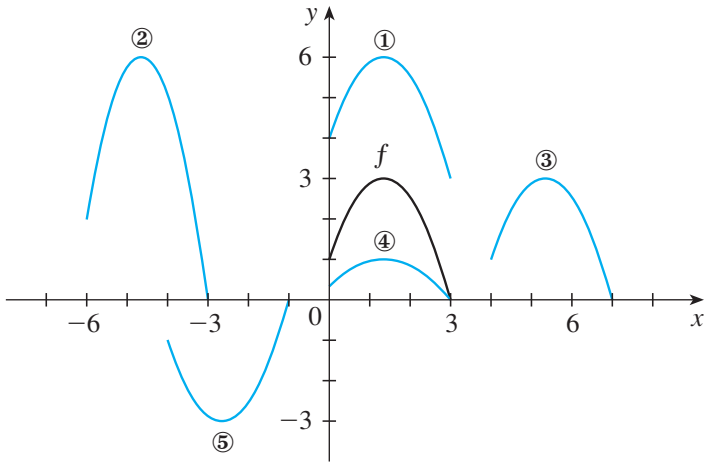
Math 201-EC Exam 1

Directions Answer all questions in the space provided. Show all work and box your final answers. Answers with no work shown will not receive full credit. If you have any questions, just ask. Good luck!

1. (8 points) Use interval notation to describe the domain of the following function.

$$f(x) = \frac{\sqrt{x+5}}{2x^2+3x-9}$$

2. (8 points) The graph of $y = f(x)$ is given below. Match each equation with its graph.



(a) $y = f(x-4)$

(b) $y = f(x)+3$

(c) $y = \frac{1}{3}f(x)$

(d) $y = -f(x+4)$

(e) $y = 2f(x+6)$

3. Suppose f and g are functions defined by

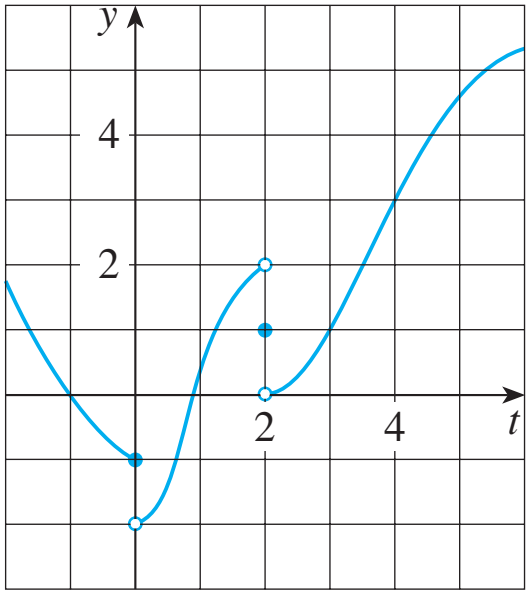
$$f(x) = x + \frac{1}{x} \quad \text{and} \quad g(x) = \frac{x+1}{x+2}.$$

(a) (4 points) Find $f \circ g(x)$ (no need to simplify) and state its domain.

(b) (4 points) Find $g \circ f(x)$ (no need to simplify) and state its domain.

(c) (4 points) Find $f \circ f(x)$ (no need to simplify) and state its domain.

4. (8 points) Consider the function g whose graph is shown below.



State the value of each quantity, if it exists. If it does not exist, explain why.

(a) $\lim_{t \to 0^-} g(t)$

(b) $\lim_{t \to 0^+} g(t)$

(c) $\lim_{t \to 0} g(t)$

(d) $\lim_{t \to 2^-} g(t)$

(e) $\lim_{t \to 2^+} g(t)$

(f) $\lim_{t \to 2} g(t)$

5. Evaluate the following limits.

(a) (8 points) $\lim_{t \to -4} \dfrac{\frac{1}{4} - \frac{1}{t}}{4 + t}$

(b) (8 points) $\lim_{\theta \to 0} \dfrac{\sin(2\theta)}{\sin(5\theta)}$

6. (8 points) Use the Squeeze Theorem to evaluate the following limit.

$$\lim_{x \to 0} x^4 \cos(\frac{2\pi}{x})$$

7. (8 points) For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x) = \begin{cases} cx^2 + 2x & \text{if } x < 2 \\ x^3 - cx & \text{if } x \geq 2 \end{cases}$$

8. Evaluate the following limits.

(a) (4 points) $\lim_{x \to \infty} \dfrac{x^3 + 5x}{2x^3 - x^2 + 4}$

(b) (4 points) $\lim_{x \to -\infty} \dfrac{7 - x}{2x^2 - 1}$