
Questions 1 – 8 are worth 4 points each:

Question 1) Consider the function:

$$f(x) = \begin{cases} x^2 + 1 & x < 2 \\ 2x + 1 & x > 2 \end{cases}$$

Calculate

$$p = f(2) \text{ and } q = \lim_{x \rightarrow 2} f(x)$$

- A) $p = 5, q = 5$
- B) $p = 5, q$ DNE
- C) p DNE, $q = 5$
- D) p DNE, q DNE
- E) $p = 5, q = 0$

Question 2) Find the domain of the function:

$$f(x) = \frac{\sqrt[3]{x-3}}{x-5}$$

- A) $(-\infty, 5) \cup (5, +\infty)$
- B) $(-\infty, \infty)$
- C) $(3, 5) \cup (5, +\infty)$
- D) $(5, +\infty)$
- E) $(-\infty, 3) \cup (3, 5) \cup (5, +\infty)$

Question 3) The supply function for a new product is given by the formula $p = s(x) = 55x + 100$. The demand function is $p = d(x) = 10x^2 + 25x$. Find the equilibrium quantity and price.

- A) $x = 2, p = 210$
- B) $x = 2, p = 90$
- C) $x = 5, p = 375$
- D) $x = 5, p = 210$
- E) None of the above

Question 4) The equation between the hours a student reviews for an exam(x) and the problems that he gets right (y) appears to be linear. If a student studies for 10 hours he gets 12 problems right. If he studies for 1 hour he gets only 2 problems right. Find the equation that connects x and y in its general form.

- A) $y - x = 1$
- B) $9y - 8x = 28$
- C) $8y - 9x = 9$
- D) $8y - 9x = 6$
- E) $9y - 10x = 8$

Question 5) Find a so that the line passing through the points $(a, 2)$ and $(1, a)$ which is perpendicular to $y - 2x = 3$.

- A) $a = 2$
- B) $a = 3$
- C) $a = \frac{5}{3}$
- D) $a = 0$
- E) $a = -2$

Question 6) Consider the function:

$$f(x) = \frac{x^3 - 3x^2}{x^2 - 5x + 6}$$

Find

$$p = \lim_{x \rightarrow +\infty} f(x) \text{ and } q = \lim_{x \rightarrow 3} f(x)$$

- A) $p = +\infty, q = +\infty$
- B) $p = 1, q = 9$
- C) $p = 0, q$ DNE
- D) $p = +\infty, q = 9$
- E) $p = +\infty, q$ DNE

Question 7) Evaluate the limit:

$$\lim_{x \rightarrow 3} \frac{\sqrt{x+1} - 2}{x^2 - 9}$$

- A) DNE
- B) $+\infty$
- C) 0
- D) $\frac{1}{24}$
- E) $\frac{1}{6}$

Question 8) Suppose that $f(x)$ and $g(x)$ are given by the formulas:

$$f(x) = \sqrt{x+1} \text{ and } g(x) = \frac{x}{\sqrt{x+1}}$$

Calculate $(f - g)(x)$ and its domain.

- A) $(f - g)(x) = \frac{1}{\sqrt{x+1}}$ and $D_{(f-g)(x)} = (-1, +\infty)$
- B) $(f - g)(x) = \frac{2x+1}{\sqrt{x+1}}$ and $D_{(f-g)(x)} = (-1, +\infty)$
- C) $(f - g)(x) = \frac{1}{\sqrt{x+1}}$ and $D_{(f-g)(x)} = [-1, +\infty)$
- D) $(f - g)(x) = \frac{2x+1}{\sqrt{x+1}}$ and $D_{(f-g)(x)} = [-1, +\infty)$
- E) None of the above

The following questions 9 – 12 are worth 2 points each:

Question 9) The domain for all rational functions is $(-\infty, +\infty)$

- A) True B) False

Question 10) The graph of the function $f(x) = ax^2 + bx + c$ is called hyperbola.

- A) True B) False

Question 11) For all functions we have:

$$\lim_{x \rightarrow a} f(x) = f(x)$$

- A) True B) False

Question 12) The domain of the composition $f \circ g$ is always the intersection of the domains of f and g . In other words

$$D_{f \circ g} = D_f \cap D_g$$

- A) True B) False

Class Roster Number: _____ Name: _____

Section: _____

This part is out of 20 points. You need to show ALL WORK to receive full credit. Any correct, justified answer will be accepted.

1. Consider the following graph of $f(x)$. (5 points)

Calculate the following:

a) $f(-5) =$

f) $\lim_{x \rightarrow 1^+} f(x) =$

b) $f(-3) =$

g) $\lim_{x \rightarrow 1} f(x) =$

c) $f(1) =$

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

d) $f(2) =$

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

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

j) $\lim_{x \rightarrow 2^-} f(x) =$

2. a) Construct the graph of the function:

$$f(x) = -|x - 3| + 2$$

Make sure you mark the vertex of the **V**.(4 points)

b) Find the domain of this function.(1 point)

3. A photo company is getting ready to sell a new camera. From previous sales the company knows that the price of the camera (p) and the number of cameras sold (x) are connected by a linear function. Namely when the price is \$150 the company sells approximately 1000 cameras and when the price is reduced by \$10, 100 cameras more are sold.

a) Find the Revenue function $R(x)$ in terms of the cameras sold (x). (2 points)

b) If it costs \$40 to make each camera and \$3000 are the fixed costs calculate the Profit function $P(x)$ in terms of the cameras sold (x). (3 points)

4. a) Find the distance between the points $(1, 1)$, $(5, 6)$. (2 points)

b) Find the equation of the circle passing through the point $(1, 1)$ with center $(5, 6)$. (2 points)

c) Is this graph a function? Explain! (1 point)

(Hint: You may use the graph and a certain well known “test”)