Name:_____

Part I. Multiple Choice. Worth three points each. Place an X in the box indicating your answer:

1	2	3	4	5	6	7	8	9	10
A	A	A	A	A	A	A	A	A	A
B	B	B	B	B	B	B	B	B	B
C	C	C	C	C	C	C	C	C	C
D	D	D	D	D	D	D	D	D	D
E	E	E	E	E	E	E	E	E	E

1. What is the domain of the function $f(x) = \sqrt{x-2}$?

   (a) $[0, \infty)$

   (b) $(0, \infty)$

   (c) $[2, \infty)$

   (d) $(2, \infty)$

   (e) None of these

2. The y-intercept of the parabola $y = x^2 - 4x$ is

   (a) -4

   (b) 1

   (c) 2

   (d) 0

   (e) None of these

3. Which of the following is true about the graph of a function?

   (a) Every horizontal line intersects it exactly once.

   (b) Every vertical line intersects it exactly once.

   (c) Every vertical line intersects it more than once.

   (d) No vertical line intersects it more than once.

   (e) None of these

4. Which of the following is NOT true?

   (a) $f(x)g(x) = g(x)f(x)$

   (b) $f(x) + g(x) = g(x) + f(x)$

   (c) $f \circ g(x) = g \circ f(x)$

   (d) $f(x) \cdot 0 = 0$

   (e) All of these are true

5. The vertex $V(h, k)$ of the parabola $y = x^2 - 4x$ is

   (a) $(2, -4)$

   (b) $(-4, 0)$

   (c) $(-2, 12)$

   (d) $(2, 4)$

   (e) None of these

6. The graph of $y = x^2 - 4x$ has x-intercepts

   (a) 1 and -4

   (b) 0 and 4

   (c) 2 and -2

   (d) It has no x-intercepts

   (e) None of these

7. If the inverse of the function f is also a function, we say that the function f is a

   (a) continuous function

   (b) piece-wise defined function

   (c) complete function

   (d) one-to-one function

   (e) None of these

8. Which of the following is true?

   (a) $f^{-1}(f(x)) = x$

   (b) $f(x) \cdot f^{-1}(x) = 1$

   (c) $f(x) + f^{-1}(x) = 0$

   (d) $f^{-1}(x) = \dfrac{1}{f(x)}$

   (e) All of these

9. The domain of $y = \dfrac{x}{x-3}$ is

   (a) $(3, \infty)$

   (b) $(-\infty, 3)$

   (c) $(-\infty, 3) \cup (3, \infty)$

   (d) $(0, \infty)$

   (e) None of these

10. The inverse function of $f(x) = x + 2$ is

   (a) $f^{-1}(x) = 2 - x$

   (b) $f^{-1}(x) = \dfrac{1}{x+2}$

   (c) $f^{-1}(x) = x - 2$

   (d) $f^{-1}(x) = -x - 2$

   (e) None of these

Part II. Show your work on the following problems.

1. Given $f(x) = \dfrac{1}{x^2 - 1}$ and $g(x) = \sqrt{x+1}$

   Find $f \circ g(x)$.

2. Find the intercepts and the coordinates of the vertex of the quadratic function $f(x) = x^2 + 2x - 3$. Sketch the graph. Specify, using interval notation, the domain and the range of f.

3. Given $f(x) = \dfrac{3x}{x+2}$, find $f^{-1}(x)$.

4. Find the equation of the linear function $f(x)$ given that $f(1) = 2$ and $f(4) = 11$.

5. Specify the interval over which the following function is increasing. Specify the interval over which it is decreasing. What is the range?
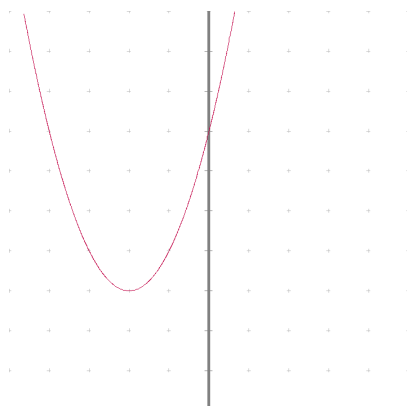
6. Use synthetic division to find the quotient and remainder when $2x^3 - x^2 - 4x + 5$ is divided by $x - 2$.

Bonus (10 points): Use long division to find the quotient and remainder of $(2x^5 - 3x^2 + 5x - 4) \div (x + 2)$.