
Write all responses on separate paper. Remember to organize your work clearly. You may *not* use your books or notes on this exam. You may use a calculator.

1. (14 points) Find the domain of each of the following functions.

(a) $f(x) = \sqrt{7 - x}$

(b) $g(x) = \frac{x}{9 - x^2}$

2. (14 points) Compute and simplify the average rate of change of over the given interval. Hint: recall that the average rate of change is of $y = f(x)$ on the interval $[a, b]$ is the slope of the line connecting $(a, f(a))$ with $(b, f(b))$.

(a) $[a, b] = [0, h]$

(b) $[a, b] = [-h, h]$

3. (18 points) Consider the quadratic function $f(x) = x^2 - 6x + 2$

(a) Express the quadratic function in standard (vertex) form: $y = a(x - h)^2 + k$

(b) Find the coordinates of the x -intercepts of the parabola.

(c) Carefully construct a large graph, showing the coordinates of the vertex and all intercepts.

4. (14 points) Find the range of the given function and express that in interval notation.

(a) $f(x) = 10 - 4(x - 1)^2$.

(b) $f(x) = -2x^2 + 8x + 1$

5. (12 points) Consider the quadratic $f(x) = x^2$. What sequence of

- horizontal shift
- vertical shrink
- reflection
- vertical shift

is required to transform this function to $g(x) = 5 - \frac{1}{2}(x + 3)^2$?

6. (14 points) Suppose $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{x - 2}$. Find a formula for and determine the domain of

(a) $(g \circ f)(x)$.

(b) $(f \circ g)(x)$.

7. (14 points) Find a formula for the inverse function of $f(x) = \frac{1}{2}x + 1$ and sketch a graph for $y = f(x)$ and $y = f^{-1}(x)$ together showing the symmetry through the line $y = x$.