Name: **Date:** **Exam 1** **Precalculus - Hargus**

1. (6 points) Write an equation for the linear function f where $f(2) = 5$ and $f(4) = -1$.

   $f(x) =$ _____

2. (12 points) Find the domain and the range of the function, and also state the equations for any vertical or horizontal asymptotes.

   (a) $f(x) = -x^2 + 3$

   (b) $f(x) = \sqrt{4 - x^2}$

   (c) $f(x) = \frac{1}{x-3} + 2$

3. (6 points) Find the inverse function $f^{-1}(x)$ for the function $f(x) = 7x - 4$.

4. (12 points) Find the coordinates of the vertex for the following quadratic functions.

   (a) $f(x) = -2(x - 3)^2 + 4$

   (b) $f(x) = x^2 - 4x + 7$

5. (6 points) Consider the function $f(x) = -x^3 + 3$. True or false?

   (a) ____ $f(x)$ has a horizontal asymptote at $y = 3$.

   (b) ____ $\lim_{x \to \infty} f(x) = \infty$

   (c) ____ $\lim_{x \to -\infty} f(x) = \infty$

6. (6 points) Let $f(x) = x^3$ and $g(x) = \sqrt[3]{x+1}$.

   (a) What is $(f+g)(3)$?

   (b) What is $(\frac{f}{g})(3)$?

   (c) What is $(f \circ g)(x)$? What is its domain?

7. (6 points) Write in the simplified form $a + bi$.

   (a) $(4 - 5i) + (2 + 7i)$

   (b) $(1 - i)(2 + 4i)$

   (c) $\dfrac{i - 4}{3i}$

8. (6 points) Write the inequality in interval notation.
   $|x - 4| \geq 1$.

9. (8 points) Use the Rational Zeros Theorem to list all **possible** rational zeros for the function $f(x) = 3x^3 + x^2 + 2$. Then, plug in to find which ones are **actual** zeros.

Possible rational zeros: $x =$ _____

Actual rational zeros: $x =$ _____

10. (8 points) Use synthetic division to divide the following (Write the final answer in **fraction form**).

$$\frac{2x^3 - 5x^2 + 3x + 7}{x - 2}$$

11. (6 points) Find the zeroes of the following functions.

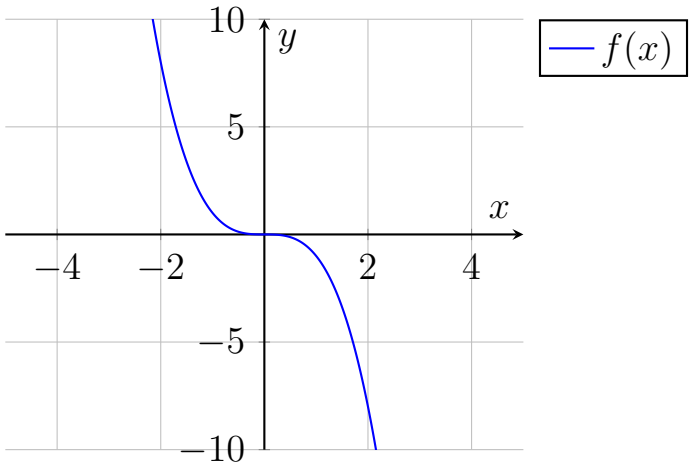
(a) $f(x) = 2x^2 + x - 1$

$x =$ _____

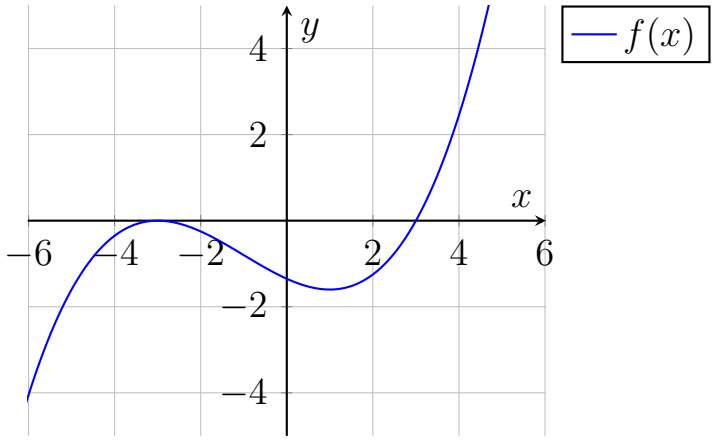
(b) $f(x) = x(x-2)(x-3)^2$

$x =$ _____

12. (6 points) The graph of $f(x) = -x^3$ is drawn below. Draw $g(x) = (x-3)^3 - 5$. (Note: pay attention to the different scales on the axes)



13. (6 points) The graph of $f(x)$ is drawn below. Draw the graph of $f^{-1}(x)$.



14. (6 points) Please sketch the graph of $f(x) = (x+1)(x-2)(x-3)$.