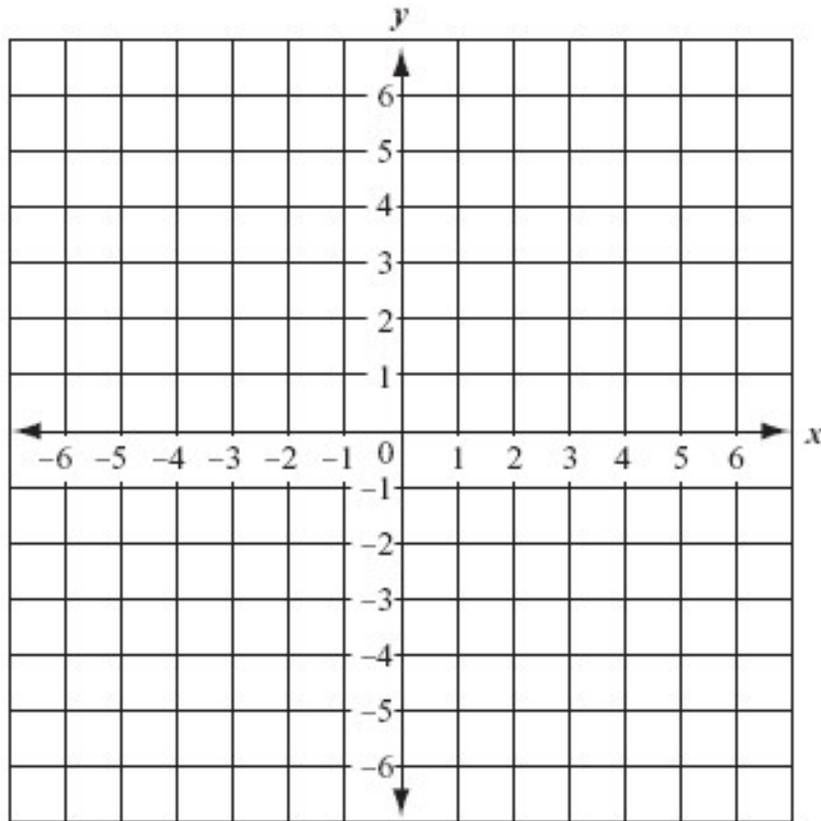


22M:009:231 - EXAM #2  
March 12, 2014

Name: \_\_\_\_\_

**Instructions:** Please write neatly and legibly, and be sure to **circle** your answer if it's not a graph. Completely erase or cross out mistakes. There are **no** calculators, cell phones, textbooks, or other notes allowed. You will have 50 minutes to complete this exam. **Best of luck!**

1. On the axes below, graph the function  $k(x) = \frac{2(x-1)(x+2)}{-x^2(x-1)}$ . Make sure to accurately graph the function's **domain**, its **zeros** and what happens near each zero, its **y-intercept(s)** (if they exist), its **vertical asymptote(s)** (if any exist), its **holes** (if any exist), and its **end behavior** (including **horizontal asymptotes** if any exist).



2. Determine whether or not the function  $g(x) = 2\sqrt{-x}$  is a one-to-one function. If you claim it is one-to-one, give a short explanation as to why given **any** two values  $x_1$  and  $x_2$ , if  $g(x_1) = g(x_2)$  then  $x_1 = x_2$ . If you claim it is not one-to-one, find two **specific** values  $c_1$  and  $c_2$  such that  $c_1 \neq c_2$  but  $g(c_1) = g(c_2)$ .

3. Solve the following equation for  $x$ . **Circle your answer!**

$$2 \ln(x) = \ln(4x + 6) - \ln(2)$$

4. Find an equation for a function  $f(x)$  satisfying  $f(x)$  is a degree 5 polynomial,  $f(x)$  has a zero of multiplicity 2 at  $x = 1$ ,  $f(x)$  has a zero at  $x = -2$ ,  $f(x)$  has no other zeros, and the graph of  $f(x)$  contains the point  $(2, 32)$ . **Circle your answer!**

5. Given functions  $f(x) = \sqrt{2x - 3}$ ,  $g(x) = |x| + 1$ , find the domain of  $f \circ g(x)$  using set notation or interval notation.

6. Given the polynomial  $g(x) = 2x^3 - 20x^2 - 12x + 10$ ,

a) List all **possible** rational roots of  $g(x)$  as guaranteed by the Rational Zeros Theorem.

b) Find **all** actual zeros of  $f(x)$ , including any irrational or complex roots if they exist.

7. Write the complex number  $(8 - 7i)(1 + 5i)$  in the form  $a + bi$ . **Circle your answer!**

8. Given the function  $k(x) = 1 - x^3$ , find  $k^{-1}(-26)$ . **Circle your answer!**

9. Find the domain of the function  $r(x) = \sqrt{\frac{1}{x-1} - \frac{2}{2x+1}}$  using set notation or interval notation.

10. If the radioactive substance known commonly as “brussel sprouts” has a half life of 7 years, given an initial sample of 600 kilograms, what will the mass of the sample be after 21 years? **Don’t forget units!**

**BONUS:** Given function  $k(x) = 2\sqrt{3 - \sqrt{4 + 5\sqrt{x}}}$ , find **four** functions  $f(x), g(x), h(x), j(x)$  such that  $k(x) = (f \circ g) \circ (h \circ j)(x)$