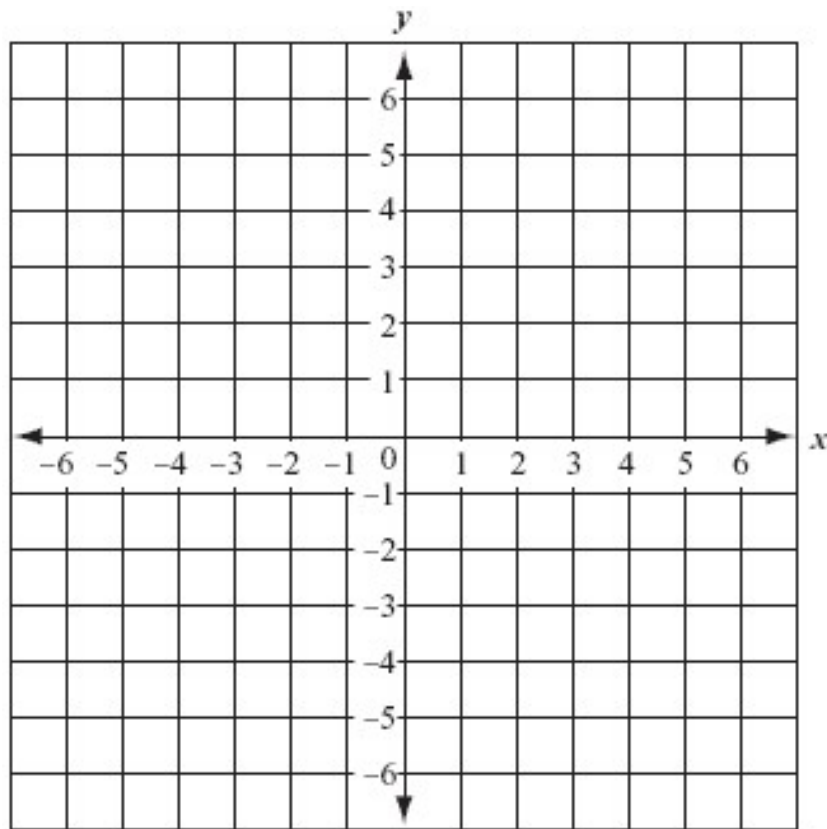


22M:009:231 - EXAM #2
March 12, 2014

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 $k(x) = (f \circ g) \circ (h \circ j)(x)$