

MATH 125
SPRING 2013
EXAM 2

NAME:

1. 10 pts. Prove the function $f(x) = 2x^3 - 5$ is one-to-one using the definition of one-to-oneness.
2. 10 pts. Prove the function $g(x) = x^4 - 3x^2$ is not one-to-one using the definition of one-to-oneness.
3. 10 pts. The function $h(x) = \frac{5x - 3}{2x + 1}$ is one-to-one. Find a formula for the inverse function h^{-1} .
4. 10 pts. each The function $r(x) = \frac{x - 1}{x + 2}$ is one-to-one.

 - (a) Find the inverse of r .
 - (b) Give the domain and range of both r and r^{-1} .
5. 10 pts. each Perform the indicated complex number operation and write the answer in the form $a + bi$.

 - (a) $(4 - 3i)(2 + 9i)$
 - (b) $\frac{3 - 2i}{2 - i}$
6. 10 pts. each Solve each quadratic equation by the indicated method.

 - (a) $18x + 9x^2 = 0$ by factoring.
 - (b) $x^2 + 6x + 13 = 0$ by completing the square.
7. For the quadratic function $f(x) = -x^2 - 8x + 5$, determine the following.

 - (a) 10 pts. The vertex of the parabola, and the axis of symmetry.
 - (b) 5 pts. Determine whether there is a maximum or minimum value for $f(x)$, and find that value.
 - (c) 5 pts. Graph f .
8. 10 pts. each Solve each absolute value equation or inequality.

 - (a) $|2x - 1| - 5 = -3$
 - (b) $|x + 5| < 8$
 - (c) $|6 - 4x| \geq 8$
9. 10 pts. Use synthetic division to perform the division: $(x^5 + x^3 - x) \div (x - 3)$.

10. 15 pts. Factor the polynomial function $f(x) = x^4 - 7x^3 + 9x^2 + 27x - 54$ into linear factors using synthetic division and appropriate theorems, then solve the equation $f(x) = 0$.
11. 10 pts. Find a polynomial function of degree 5 with $-\frac{1}{2}$ as a zero of multiplicity 2, 0 as a zero of multiplicity 1, and 1 as a zero of multiplicity 2.
12. 10 pts. Find a polynomial function of lowest degree with rational coefficients that has $2 - i$ and -1 as some of its zeros.
13. 15 pts. Find all the zeros of the function $f(x) = x^4 + 5x^3 - 27x^2 + 31x - 10$ using synthetic division and appropriate theorems.