MATH 120
FALL 2014 NAME:
EXAM 1

1. [10 pts.] Evaluate $-s^2 + 8t + r^2$, given that $s = -5$, $t = 3$, and $r = -4$.

2. [10 pts. each] Perform the indicated operation.
   (a) $(u^3 - 2u^2 + 5) - 2(-7u^3 + 11u^2)$
   (b) $(3v + 2)(4v^2 - 7v + 6)$
   (c) $(a - 8b)^2$

3. [10 pts.] Divide by long division: $\dfrac{8x^4 + 6x^2 - 3x + 1}{2x^2 - x + 2}$

4. [10 pts. each] Fully factor each polynomial.
   (a) $10ab - 6b + 35a - 21$
   (b) $9z^2 + 4z - 2$
   (c) $32a^2 + 48ab + 18b^2$
   (d) $36k^2 - 81\ell^4$
   (e) $1000x^3 + 343y^3$

5. [10 pts. each] Find each product or quotient.
   (a) $\dfrac{q^3 + q^2}{7} \cdot \dfrac{49}{q^4 + q^3}$
   (b) $\dfrac{x^2 + x - 2}{x^2 + 3x - 4} \div \dfrac{x^2 + 3x + 2}{x^2 + 4x + 3}$

6. [10 pts.] Find the sum: $\dfrac{5}{12x^2y} - \dfrac{7}{6xy^3}$

7. [10 pts.] Simplify the complex fraction:
$$\frac{1 - \dfrac{2}{3x}}{9 - \dfrac{4}{x^2}}$$

8. [10 pts.] Simplify, writing the answer using only positive exponents: $\dfrac{(r^{-1/5}s^{2/3})^{15}}{r^{-2}}$.

9. [10 pts.] Factor $t^{-5} - 3t^{-3}$ using the common factor t^{-5}.

10. [10 pts. each] Simplify each radical expression.

    (a) $\sqrt{25j^4k^2}$, given j and k are positive.

    (b) $\sqrt{8x^5z^3}$, given x and z can be any real number.

    (c) $\sqrt[3]{\dfrac{9}{16r^4}}$

    (d) $\sqrt[4]{\sqrt[3]{12}}$

    (e) $\sqrt[3]{32} - 5\sqrt[3]{4} + 2\sqrt[3]{108}$

11. [10 pts.] Solve the equation: $4[2x - (3 - x) + 5] = -6x - 28$.

12. [10 pts.] Solve for a: $ax + b = 3(x - a)$.

13. [15 pts.] What quantity of a 60% acid solution must be mixed with 400 mL of a 45% acid solution to produce a 55% acid solution? (Round to the nearest tenth of a milliliter.)

14. [15 pts.] Professor Emeritus Angus McPratt invested \$12,000, a portion earning a simple interest rate of 5.5% per year and the rest earning a rate of 4% per year. After one year the total interest earned on these investments was \$560. How much money did he invest at each rate?

15. [10 pts. each] Perform the indicated operation and write the answer in the standard form for complex numbers.

    (a) $(3 - 6i) - (-8 - 13i)$

    (b) $(4 - 3i)(2 + 9i)$

    (c) $\dfrac{3 - 2i}{1 - 2i}$

    (d) i^{265}