1. [10 pts.] Evaluate $-s^2 - 8t + r^2$, given that $s = -2$, $t = 3$, 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: $\dfrac{10y^3 + 11y^2 - 2y + 3}{5y + 3}$

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: $\dfrac{\left(r^{-1/5}s^{2/3}\right)^{15}}{r^{-2}}$.

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

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

    (a) $\sqrt{25j^4k^2}$

    (b) $\sqrt{8x^5z^8}$ (assume variables represent positive real numbers)

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

    (d) $\sqrt[4]{\sqrt[3]{5}}$

    (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.] Mary and Jane are running in the Kumquat Hillock Happy Dash. Mary runs at 7 mph, Jane at 5 mph. If they start at the same time, how long with it be before they are 1.8 miles apart?

14. [15 pts.] Linda won \$200,000 in a state lottery. She first paid income tax of 30% on the winnings. She invested some of the rest at 1.5% interest, and some at 4% interest, earning a total of \$4350 in interest in a year. How much did she invest at each rate?

15. [10 pts.] Find the product of the complex numbers and write the answer in standard form: $(2 + 5i)(2i - 4)$.

16. [10 pts.] Find the quotient of the complex numbers and write the answer in standard form: $\dfrac{1 + 2i}{1 - 3i}$.