

MATH 120
WINTER 2015
EXAM 1

NAME:

1. 10 pts. Given that $p = -5$, $q = 8$, and $r = -10$, evaluate

$$\frac{-(p+2)^2 - 3r}{2-q}.$$

2. 10 pts. each Perform the indicated operation.

(a) $(u^3 - 2u^2 + 5) - 2(-7u^3 + 11u^2)$

(b) $x^2 \left(3x - \frac{2}{3}\right) \left(5x + \frac{1}{3}\right)$

(c) $(z - 3)^3$

3. 10 pts. Divide by long division:

$$\frac{30t^3 - 9t^2 + 22t + 5}{5t + 1}$$

4. 10 pts. each Fully factor each polynomial.

(a) $4t^2 - 12t + 9$

(b) $20p^2 - 100pq + 125q^2$

(c) $k^4 - 625$

(d) $27 + 8\alpha^3$

5. 10 pts. each Find each product or quotient.

(a) $\frac{q^3 + q^2}{7} \cdot \frac{49}{q^4 + q^3}$

(b) $\frac{x^2 + x - 2}{x^2 + 3x - 4} \div \frac{x^2 + 3x + 2}{x^2 + 4x + 3}$

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

7. 10 pts. Simplify the complex fraction:

$$\frac{\frac{1}{\ell} - \frac{1}{\ell+1}}{\frac{1}{\ell} + \frac{1}{\ell+1}}$$

8. 10 pts. Simplify, writing the answer using only positive exponents:

$$\frac{(g^2h^3)^4(gh^4)^{-3}}{g^2h}$$

9. 10 pts. Factor $6w^{-2/3} - 5w^{-5/3}$ using the common factor $w^{-5/3}$.

10. 10 pts. each Simplify each radical expression. Assume variables represent nonzero real numbers (but not necessarily positive numbers).

(a) $\sqrt[4]{81a^8b^4}$

(b) $\sqrt[3]{\frac{5}{3y}}$

(c) $\frac{\sqrt{2}}{\sqrt{3} - \sqrt{2}}$

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

12. 10 pts. Solve for x :

$$\frac{x - 1}{2a} = \frac{1}{a - b}$$

13. 15 pts. A coast guard boat that patrols a river cruises at 30 km/h in still water. The river flows at 6 km/h. For each patrol the captain of the boat must travel upstream and then return. The round trip takes exactly 6 hours. How far upstream does the boat go?

14. 15 pts. A shylock has loaned a total of \$120,000 to two mathematically-challenged fellows named Rudy and Rocko. Part of the money was loaned to Rudy at 22% interest....per week. The rest was loaned to Rocko at 35% interest per week. If the shylock collects \$36,150 in interest after the first week, how much money did he loan to Rudy?

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

(a) $(4 - 3i)(2 + 7i)$

(b) $\frac{1 - 2i}{2 + i}$