

MTH 121
Some Review Problems for Exam 2
Spring 2013

These formulas may or may not be useful:

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \quad a^3 - b^3 = (a-b)(a^2 + ab + b^2) \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

x -axis: $y \rightarrow -y$

y -axis: $x \rightarrow -x$

origin: $x \rightarrow -x$ and $y \rightarrow -y$

1. Write the rational expression in simplest form.

$$\frac{x^3 + 5x^2 + 6x}{x^2 - 4}$$

2. Write the rational expression in simplest form.

$$\frac{2 - x + 2x^2 - x^3}{x^2 - 4}$$

3. Write the rational expression in simplest form.

$$\frac{z^3 - 8}{z^2 + 2z + 4}$$

4. Combine into a single fraction and simplify.

$$\frac{x^2 - 36}{x} \div \frac{x^3 - 6x^2}{x^2 + x}$$

5. Combine into a single fraction and simplify.

$$\frac{1}{x^2 - x - 2} - \frac{x}{x^2 - 5x + 6}$$

6. Find the distance between the points. $(-3, -1)$, $(2, -1)$

7. Show that the points form the vertices of the indicated polygon.

Right triangle: $(4, 0)$, $(2, 1)$, $(-1, -5)$

8. For the given points, (a) plot the points, (b) find the distance between the points, and (c) find the midpoint of the line segment joining the points.

$(-1, 2)$, $(5, 4)$

9. An airplane flies from Naples, Italy, in a straight line to Rome, Italy, which is 120 kilometers north and 150 kilometers west of Naples. How far does the plane fly?

10. The Coca-Cola Company had sales of \$19,805 million in 1999 and \$28,857 million in 2007. Use the midpoint formula to estimate the sales in 2003. Assume that the sales followed a linear pattern.

11. Use the algebraic tests to check for symmetry with respect to both axes and the origin.

$$y = \frac{x}{x^2 + 1}$$

12. Write the standard form of the equation of the circle with the given characteristics.

Endpoints of a diameter: $(0, 0)$, $(6, 8)$

13. Solve: $\frac{5x}{4} + \frac{1}{2} = x - \frac{1}{2}$

14. Solve (and check your answer): $3 = 2 + \frac{2}{z+2}$
15. Solve (and check your answer): $\frac{1}{x+3} + \frac{1}{x-3} = \frac{10}{x^2-9}$
16. Solve the quadratic equation by factoring: $3 + 5x - 2x^2 = 0$
17. Solve the quadratic equation by factoring: $\frac{3}{4}x^2 + 8x + 20 = 0$
18. Solve the quadratic equation by extracting square roots: $(2x - 1)^2 = 18$
19. Solve the quadratic equation by completing the square: $x^2 + 6x + 2 = 0$
20. Solve the quadratic equation by completing the square: $2x^2 + 5x - 8 = 0$
21. Use the discriminant to determine the number of real solutions of the quadratic equation.
 $\frac{1}{3}x^2 - 5x + 25 = 0$
22. Use the Quadratic Formula to solve the equation. $12x - 9x^2 = -3$
23. Use the Quadratic Formula to solve the equation. $(y - 5)^2 = 2y$
24. Find all solutions. $4x^4 - 65x^2 + 16 = 0$
25. Find all solutions (and check your answer). $|x + 1| = x^2 - 5$
26. For the given interval, (a) write an inequality that represents the interval, and (b) state whether the interval is bounded or unbounded. $[0, 9)$
27. Solve the inequality and sketch the solution on the real number line.

$$\frac{3}{4}x - 6 \leq x - 7$$

28. Solve the inequality and sketch the solution on the real number line.

$$-8 \leq 1 - 3(x - 2) < 13$$

29. Solve the inequality and sketch the solution on the real number line.

$$|3 - 4x| \geq 9$$

30. Solve the inequality and sketch the solution on the real number line.

$$|9 - 2x| - 2 < -1$$

31–41. Word problem handouts (with Gasoline Problem and Gasoline Consumption Problem) #1-11 all.

42–54. Word problem handouts (with Wages Problem and Truck and Patrol Car Problem) #1-13 all.

Original location of the above problems.

1–5. P.5 #35, 39, 41, 55, 65

6–10. P.6 #29, 43, 51, 57, 71.

11–15. 1.1 #29, 67; 1.2 #43, 61, 67.

16–20. 1.4 #19, 23, 35, 41, 47.

21–25. 1.4 #69, 83, 93; 1.6 #19, 75.

26–30. 1.7 #7, 41, 49, 65, 69.