

Math 1021 Review for Final

NOTE THIS REVIEW IS NOT ALL ENCOMPASSING. All the general topics that will be covered on the final are included here. **THERE MIGHT BE TYPES OF PROBLEMS ON THE TEST THAT ARE NOT ON THIS REVIEW.** You must know how to do any of the homework problems that were assigned on these general topics and you should review similar problems on the tests. **Any problem similar to a sample problem or a homework problem may appear on the test. You are also responsible for the examples worked out in each assigned section in the textbook even though they are not done in class.**

1. Simplify the following. Express answers in terms of positive exponents.

$$(a) (2a^{-3}b^2)^{-2} \quad (b) \left(\frac{x^2}{y^4}\right)^{-3} \quad (c) \frac{4x^{-3}y^{-5}}{6x^{-4}y^3} \quad (d) \left(\frac{m^{-3}m^3}{n^{-2}}\right)^{-2} \quad (e) \left(\frac{x^4y^{-1}}{x^{-2}y^3}\right)^2$$
$$(f) (27x^3)^{2/3} \quad (g) (16x^8y^{-4})^{1/4} \quad (h) \left(\frac{x^{-1/3}y^{1/2}}{x^{-1/4}y^{1/3}}\right)^6$$

2. Perform the indicated operations and simplify when needed.

$$(a) (2x^3 - 3x^2 + x + 5) + (2x^2 + x - 1) \quad (b) (2x^3 - 3x^2 + x + 5) - (2x^2 + x - 1)$$
$$(c) (2x^3 - 3x^2 + x + 5)(2x^2 + x - 1) \quad (d) 2x^2 + x - 1 \sqrt{2x^3 - 3x^2 + x + 5}$$
$$(e) (2x + 3y)^2 \quad (f) (2x - 3y)^2 \quad (g) (2x + 3y)(2x - 3y) \quad (h) (3x + 2)(4x - 3)$$

3. Perform the indicated operations and simplify your answers.

$$(a) \frac{x}{x-3} + \frac{3}{3-x} \quad (b) \frac{y-3}{y^2-4} - \frac{y+2}{y^2-4y+4} - \frac{2}{2-y} \quad (c) \frac{x+1}{x-x^2} \cdot \frac{x^2-2x+1}{x^2-1}$$
$$(d) \frac{4x^2-4x+1}{2x^2+5x-3} \div \frac{2x^2-3x-2}{2x^2+7x+3}$$

4. Simplify the following radicals expressions:

$$(a) \sqrt{12x^3y^5z^2} \quad (b) \sqrt[3]{\frac{8a^7}{27b^3}} \quad (c) \frac{6x - \sqrt[4]{32x^8}}{2x}$$

5. Express the following in terms of rational exponents.

$$(a) \left(\sqrt{(x+1)^3} \right)^5$$

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

6. Rationalize the denominator in each of the following.

$$(a) \frac{5}{\sqrt{5x}}$$

$$(b) \frac{1}{\sqrt{x-1}}$$

$$(c) \frac{1}{\sqrt{x-3}+2}$$

In 7–17, solve the equations for x .

$$7. 3x+11-(6x-11)=0$$

$$8. 5(x-2)+3(3x-1)=4(x-3)+7x$$

$$9. 11x=2x^2+12$$

$$10. 4x^2=8x$$

$$11. 25x^2-9=0$$

$$12. x^2-10x-3=0$$

$$13. 2x^2+1=4x$$

$$14. \frac{2}{x^2-9} - \frac{3}{x-3} = \frac{1}{x+3}$$

$$15. \frac{x}{x-2} - \frac{4}{x^2-2x} = \frac{5}{x}$$

$$16. \sqrt{2x+1} - \sqrt{x+4} = 1 \text{ (check required)}$$

$$17. x^4 - 7x^2 + 10 = 0$$

$$18. x^5 = 7$$

In 19–21, solve the inequalities and graph the solutions. Express the solutions in interval notation.

$$19. -4x-5 \leq 0$$

$$20. \frac{x+2}{x-3} \leq 0$$

$$21. x^2 + 21 > 10x$$

22. A boat cruises 36 mi against a 3-mph current and 36 mi back in the direction of the same current. The round trip takes 5 hours. What is the speed of the boat in still water?

23. Ann can clean a pool in 3 hours and Mary can clean it in 2 hours. How long will it take the girls to clean the pool together?

24. Find an equation of the line passing through the points $P_1(-4, -4)$ and $P_2(-5, 2)$.

25. What is the distance between points P_1 and P_2 from the previous problem.

26. Graph the lines $y = 2x - 3$, $y = -2x + 3$, $y = -4$, and $x = 2$. Clearly label any intercepts.

In 27 & 28, find the axis of symmetry and vertex of the parabola. Find the x -intercepts and the y -intercept of the parabola. Graph the parabola clearly labeling the vertex, the axis of symmetry and the intercepts.

27. $y = -x^2 - 2x + 3$ 28. $y = x^2 - 2x - 3$

29. Solve the following systems of equations:

(a) $\begin{cases} 2x - 3y = 7 \\ 3x - y = 1 \end{cases}$ (b) $\begin{cases} 7x - 5y = -1 \\ 3x + 2y = 12 \end{cases}$

30. Find the equation of a circle with a radius 4 and center $(-3, 6)$ and graph the circle.

31. By completing the square in x and y , find the center and radius of the circle.

$$x^2 + y^2 + 6x - 4y = 23$$

32. Find the standard equation of the circle whose center having the line segment from $(-2, -1)$ to $(6, 3)$ as a diameter.

33. Find the domain of the following functions:

(a) $f(x) = \frac{15}{x-3}$ (b) $g(x) = 16 + 3x - x^2$ (c) $h(x) = \sqrt{x-5}$ (d) $F(x) = \frac{1}{\sqrt{x-5}}$

34. For $f(x) = 2x - 3$, find (a) $f(2a)$ (b) $\frac{f(x+h) - f(x)}{h}$.

35. For $f(x) = x^3$, $g(x) = \frac{1}{x}$, find $f + g$, $f - g$, fg , f/g .

36. For $f(x) = \sqrt{9-x}$, $g(x) = x^2$, find $f \circ g$ and $g \circ f$. Simplify your answers if possible.

37. An object is shot straight up from the ground with an initial velocity of 112 ft/sec.

- a) Find the interval of time t during which the object is 160 feet above the ground or higher.
- b) At what time does the object reach its highest point and what is the highest point reached by the object?

Note: The equations relating to the motion of gravity are $y = -16t^2 + v_0t + y_0$ and $v = -32t + v_0$ where v_0 is the initial velocity and y_0 is the height with respect to the ground at time $t = 0$. Here, we assume that $y = 0$ at the ground level.