Math 1021 Review for Test 3

NOTE THIS IS NOT ALL ENCOMPASSING. 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. **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.**

Find all real solutions to the following equations

1. $11x = 2x^2 + 12$ 2. $4x^2 = 8x$ 3. $25x^2 - 9 = 0$ 4. $x^2 - 12 = 0$

5. $x^2 - 10x - 3 = 0$ 6. $2x^2 + 1 = 4x$

By completing the square, find all real solutions to the following equations:

7. $x^2 - 6x - 3 = 0$ 8. $2x^2 - 6x + 3 = 0$

Perform the indicated operation. Please state your answers in the form $a + bi$ where a and b are real numbers.

9. $(-2 + 3i) - (-3 - 2i)$ 10. $(-2 + 3i)(-3 - 2i)$ 11. $\dfrac{-3 - 2i}{-3 + 2i}$

Find all real and complex solutions to the following equations:

12. $x^2 - 4x + 5 = 0$ 13. $2x^2 + 4x = -5$

Find all real solutions to the following equations:

14. $\sqrt{2x + 1} - \sqrt{x + 4} = 1$ (**check required**)   15. $x^4 + 3x^2 - 10 = 0$

16. $\dfrac{x}{x - 2} - \dfrac{4}{x(x - 2)} = \dfrac{5}{x}$ 17. $y^{1/2} + y^{1/4} - 6 = 0$ (**check required**)

18. $x - 3 = \sqrt{3x - 11}$ (**check required**)

Solve the following inequalities by testing intervals. State your answers in interval notation. Graph your solutions.

19. $x^2 + 21 > 10x$ 20. $-x^2 - 2x + 3 \geq 0$ 21. $\dfrac{x - 2}{x + 4} \leq 0$ 22. $\dfrac{x^2 - x - 12}{x^2 - 4} \geq 0$

23. 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 $y = -16t^2 + v_0 t + y_0$ 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.

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

25. By completing the square in x and y, find the center and radius of the circle.
$$x^2 + y^2 + 6x - 4y = 23$$

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

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. A rectangular parking lot with a straight road as one side is to be fenced on the other three sides by 1000 ft of aluminum fencing. If the area of the lot is to be maximized, what should be its length and width? [Hint: write the area of the lot as $ax^2 + bx + c$.]