Honors Algebra 2 **Name____________________**
WS: Chapter 3 Review **Date___________Block_____**

All work and answers should be done on separate paper.
When necessary, answers should be given as fractions or radicals in simplest form.

1. A spool of ribbon has a length of $x^3 + x^2$ inches. Write an expression that represents the number of strips of ribbon with a length of $x - 1$ inches that can be cut from one spool.

2. Ms. Liao runs a small dress company. From 1995 through 2005, the number of dresses she made can be modeled by $N(x) = 0.3x^2 - 1.6x + 14$ and the average cost to make each dress can be modeled by $C(x) = -0.001x^2 - 0.06x + 8.3$, where x is the number of years since 1995. Write a polynomial that can be used to model Ms. Liao's total dressmaking costs, $T(x)$, for those years.

3. You want to create a box without a top from an 11 in. by 14 in. sheet of paper. You will make the box by cutting squares of equal size (length of each square is x inches) from each corner of the sheet of paper. Write a function $V(x)$ (in standard form) to represent the volume of the box.
   a. If you make the box with the maximum possible volume, what is the maximum volume and what will be the length of the sides of the squares you cut out? Round your answers to the nearest hundredth.

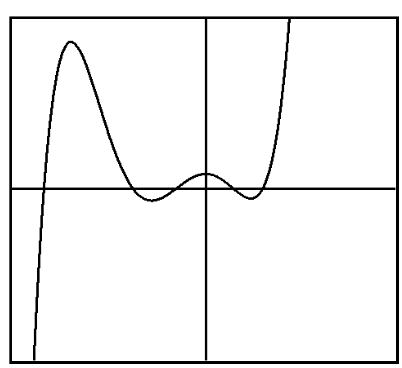
4. A popcorn producer is designing a new box for the popcorn. The marketing department has designed a box with the width 2 inches less than the length and with the height 5 inches greater than the length. The volume of each box must be 24 cubic inches. What is the length of the box?

5. An engineering class is designing model rockets for a competition. The body of the rocket must be cylindrical with a cone-shaped top. The cylinder part must be 60 cm tall, and the height of the cone must be twice the radius. The volume of this region must be 558π cm^3 in order to hold cargo. Find the radius of the rocket.

In 6 - 8, simplify completely.

6. $(2x + y)(2x - y)$
7. $(60 - 16y^2 + y^4) \div (10 - y^2)$
8. $(x^4 + 6x^3 + 6x^2) \div (x + 5)$

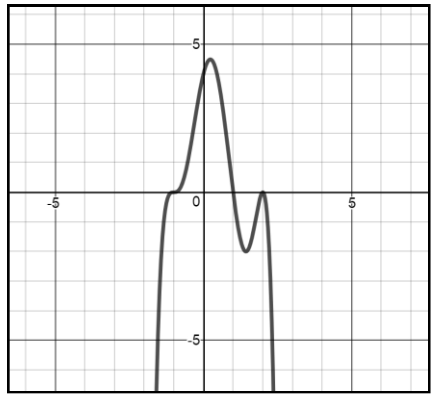
For questions 9 – 10, use the graph shown below.



9. State the number of real zeros of the function.

10. Describe the behavior of the graph, including least possible degree, number of turning points, number of real zeros, postitive or negative leading coefficient, and end behavior.

11. The graph of $f(x) = -x^6 + 2x^5 + 4x^4 - 6x^3 - 7x^2 + 4x + 4$ is shown below. Use the graph to identify the values of x for which $f(x) = 0$ and to factor $f(x)$.



In 12 - 15, factor completely.

12. $8y^3 - 4y^2 - 50y + 25$

13. $24n^2 + 3n^5$

14. $2x^4 - 2x^3 - 8x^2 + 8x$

15. $y^5 + 27y^2$

In 16 - 17, factor the polynomial given that $f(k) = 0$. Write $f(x)$ in completely factored form.

16. $f(x) = 2x^3 - 3x^2 - 8x - 3$; $k = 3$

17. $f(x) = 3x^3 - 19x^2 - 22x + 56$; $k = 7$

In 18 - 19, list the possible rational zeros of the function using the rational root theorem.

18. $f(x) = x^3 + 7x - 9$

19. $f(x) = -3x^4 - 5x^3 - 3x^2 + 7x + 8$

In 20 - 23, find all the zeros of the function.

20. $g(x) = x^3 - x^2 - x + 1$

21. $f(x) = 2x^3 - 5x^2 - 2x + 2$

22. $f(x) = x^3 - 2x - 4$

23. $h(x) = 4x^4 + x^3 + 25x^2 + 7x - 21$

In 24 - 26, write the simplest polynomial function with the given roots.

24. -2, i, $\sqrt{3}$

25. 0, $4 - i$

26. $1 + \sqrt{3}$

In 27 - 28, identify the leading coefficient, degree, and end behavior.

27. $r(x) = -6x^4 + 4x^3 - x^2 + 1$

28. $q(x) = 12 + 8x - 16x^3 - x^2$

In 29 - 30, graph each function on a calculator and estimate the local maxima and minima.

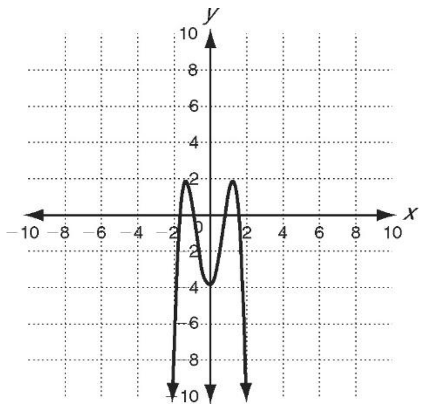
29. $P(x) = -x^4 + 4x^3 - 2x^2 - x + 5$

30. $P(x) = x^5 - x^4 - 5x^2$

In 31 – 32, for $f(x) = -2x^4 + 7x^2 - 4$, write the rule for each function and identify the transformation. Make a sketch of each graph on the coordinate plane provided. (The graph of $f(x)$ is already done for you.)

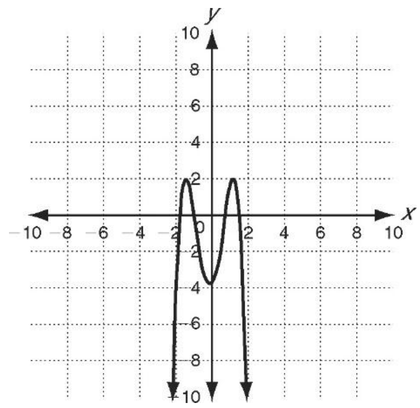
31. (a) $g(x) = f\left(\frac{1}{4}x\right)$

(b) $g(x) = 4f(x)$



32. (a) $g(x) = f(x-5)$

(b) $g(x) = 0.25f(x)$



33. Write a function $g(x)$ that transforms $f(x) = 4x^3 - 5$ in each of the following ways.

a. Move 2 units left and reflect across the x-axis

b. Compress horizontally by a factor of $\frac{1}{5}$ and move 1 unit up.

c. Stretch vertically by a factor of 3 and move 3 units right.

d. Reflect $f(x)$ across the y-axis.