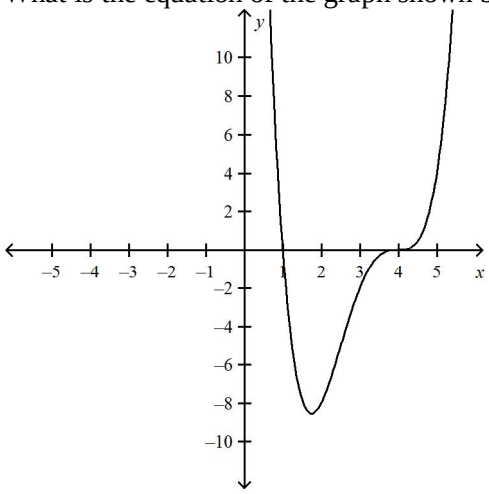
Name: _____

Advanced Functions: Chapter Two Test - Polynomial Functions

Multiple Choice **K___/6,** **T___/4**

*Circle (CLEARLY) the choice that best answers the question, **AND** write the letter of your choice.*

1. Which of the following statements about a polynomial function is false?
   a. A polynomial function of degree *n* has at most *n* turning points.
   b. A polynomial function of degree *n* may have up to *n* distinct zeros.
   c. A polynomial function of odd degree must have at least one zero.
   d. A polynomial function of even degree may have no zeros.
2. What is the degree and lead coefficient of $f(x) = -x + 5x^2 - 6x^3 + 10$?
   a. degree 1 with a lead coefficient of –1
   b. degree 3 with a lead coefficient of –1
   c. degree 3 with a lead coefficient of –6
   d. degree 6 with a lead coefficient of –1
3. What is the equation of the graph shown below?



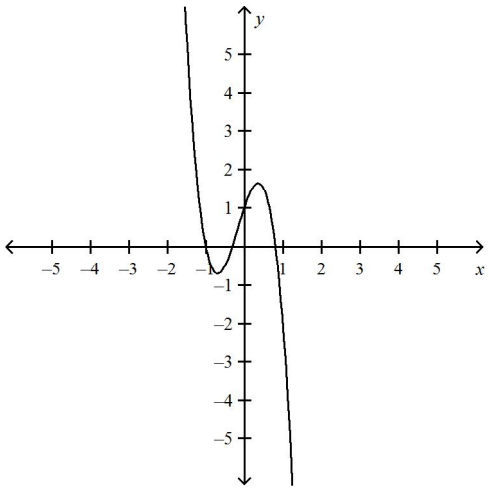
   a. $f(x) = (x-4)(x-1)$
   b. $f(x) = (x-4)^2(x-1)$
   c. $f(x) = (x+4)^3(x+1)$
   d. $f(x) = (x-4)^3(x-1)$
4. Describe the transformations that were applied to $y = x^3$ to create $y = (\frac{3}{4}(x+3))^3 - 2$.
   a. horizontally stretched by a factor of $\frac{4}{3}$, horizontally translated 3 units to the left, and vertically translated 2 units down
   b. horizontally stretched by a factor of $\frac{3}{4}$, horizontally translated 3 units to the left, and vertically translated 2 units down
   c. horizontally stretched by a factor of 3, horizontally translated $\frac{4}{3}$ units to the left, and vertically translated 2 units down
   d. horizontally stretched by a factor of $\frac{3}{4}$, horizontally translated 2 units to the right, and vertically translated 3 units up

Name: _____

5. Which expression is the sum of two cubes?
   a. $-8x^3 + 64$
   c. $9x^3 + 16$
   b. $-8x^2 - 64$
   d. $25 - 49y^2$

6. Write the expression $27x^3 - 1$ in factored form.
   a. $(3x + 1)(3x - 1)$
   c. $(3x + 1)(9x^2 - 3x + 1)$
   b. $(9x - 1)(81x^2 + 9x + 1)$
   d. $(3x - 1)(9x^2 + 3x + 1)$

7. Using end behaviours, and zeros, determine the polynomial equation that represents the graph shown below.



   a. $g(x) = -4x^3 + 3x + 1$
   c. $g(x) = -4x^3 + 2x^2 + 3x + 1$
   b. $g(x) = -4x^4 - 3x^3 - 2x^2 + 3x + 1$
   d. $g(x) = -4x^3 - 2x^2 + 3x + 1$

8. If any of the linear factors of a polynomial function are squared, then which of the following is not true of the corresponding *x*-intercepts?
   a. The *x*-intercepts are turning points of the curve.
   b. The *x*-axis is tangent to the curve at these points.
   c. The graph passes through the *x*-axis at these points.
   d. The graph has a parabolic shape near these *x*-intercepts.

9. Which one of the following is not a factor of $f(x) = 2x^3 + 9x^2 + 3x - 4$?
   a. $2x - 1$
   c. $x + 4$
   b. $x - 1$
   d. $x + 1$

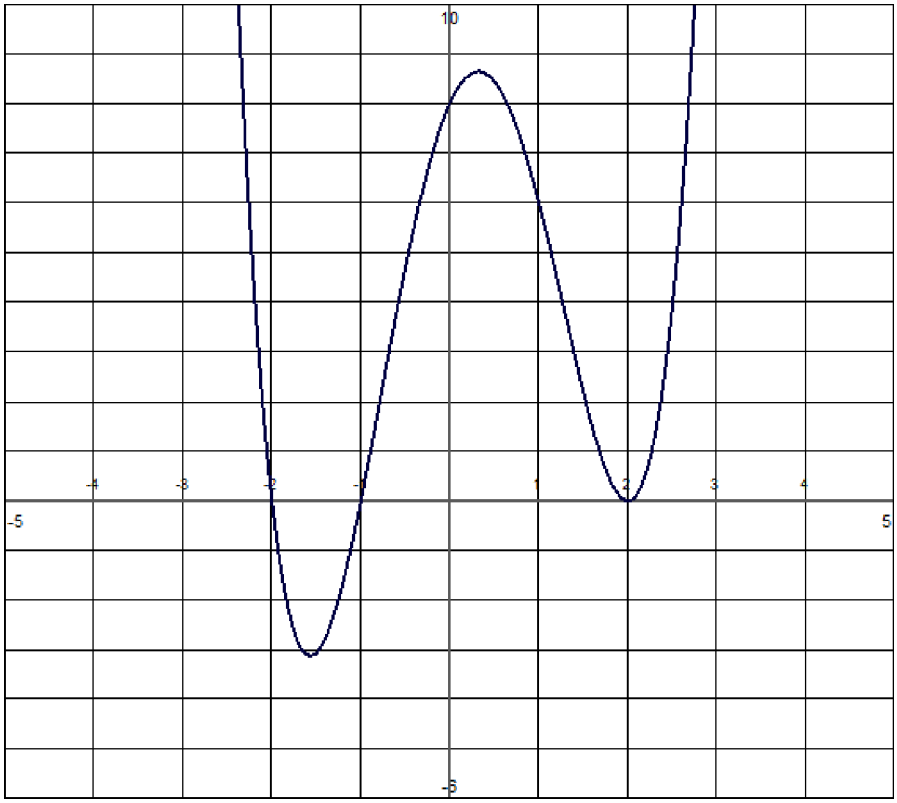
10. What is the remainder when $x + 6$ is divided into $x^4 - 2x^3 + x^2 + 4x - 25$?
   a. 1715
   c. –25
   b. 899
   d. –949

Written Solutions: Provide clear solutions to the following problems. Write your solutions in the Answers Booklet. You will receive a ***Communications grade, out of 10*** for how well your math is presented.

11. Without expanding, state the order (degree), the leading coefficient, and the end behaviours of the polynomial function $g(x) = x(3x - 4)(-2x + 1)(x - 5)$. (you may use a "sketch" to describe the end behaviours). **T___/3**

Name: _____

12. Given the sketch of the graph of a polynomial function $f(x)$, state:
    a) whether the function is even or odd ordered (with a reason)
    b) where the function is increasing
    c) any maximums and/or minimums. **K___/4**



13. Write the equation and sketch an example of a quartic function with the zeros at –4, 2 (order 3), if $f(0) = 4$. What further information about the polynomial function is needed for an "accurate" sketch of the function's graph? **T___/5**

14. Determine the maximum and minimum number of turning points for the polynomial function $g(x) = 4x^4 - 5x^5 + 2x^2 - 7$. Give a reason for your answer **K___/2**

15. State the Remainder Theorem. **K___/3**

16. Divide: $(x^2 - 6x^4 + 9) \div (x^2 + 2)$. **T___/4**

17. Divide $(6x^4 - 6x^3 + 5x^2 - 12x + 1) \div (x + 2)$ using synthetic division. **K___/3**

18. When $ax^3 - x^2 + 3x + b$ is divided by $x - 2$, the remainder is 59. When it is divided by $x + 1$, the remainder is –1. Find the values of a and b. **A___/4**

19. Sketch $f(x) = 2x^4 + 7x^3 + 3x^2 - 8x - 4$, providing as much deatail about the behaviour of the function as possible. Label at least 4 points. **A__/7**