LG 5 Ver B

Name: _____ Student #:_____

Date:_____ T.A. #:_____

Mathematics 12 Pre-Calculus
LEARNING GUIDE 5 TEST – POLYNOMIAL FUNCTIONS

*NO GRAPHING CALCULATORS PERMITTED ON THIS TEST

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***Full marks will NOT be given for the final answer only.**

When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. Write an example of a polynomial function. Explain why it is a polynomial function. (2 marks)

$y = 5x^3 - 2x + 3$ IS AN EXAMPLE

THE EXPONENTS ARE WHOLE NUMBERS

2. For the polynomial function $f(x) = 7x^2 + 11 - 8x$ state: (2 marks)

   a) The degree: 2

   b) Name of the polynomial function: QUADRATIC

   c) Leading coefficient: 7

   d) Constant term: 11

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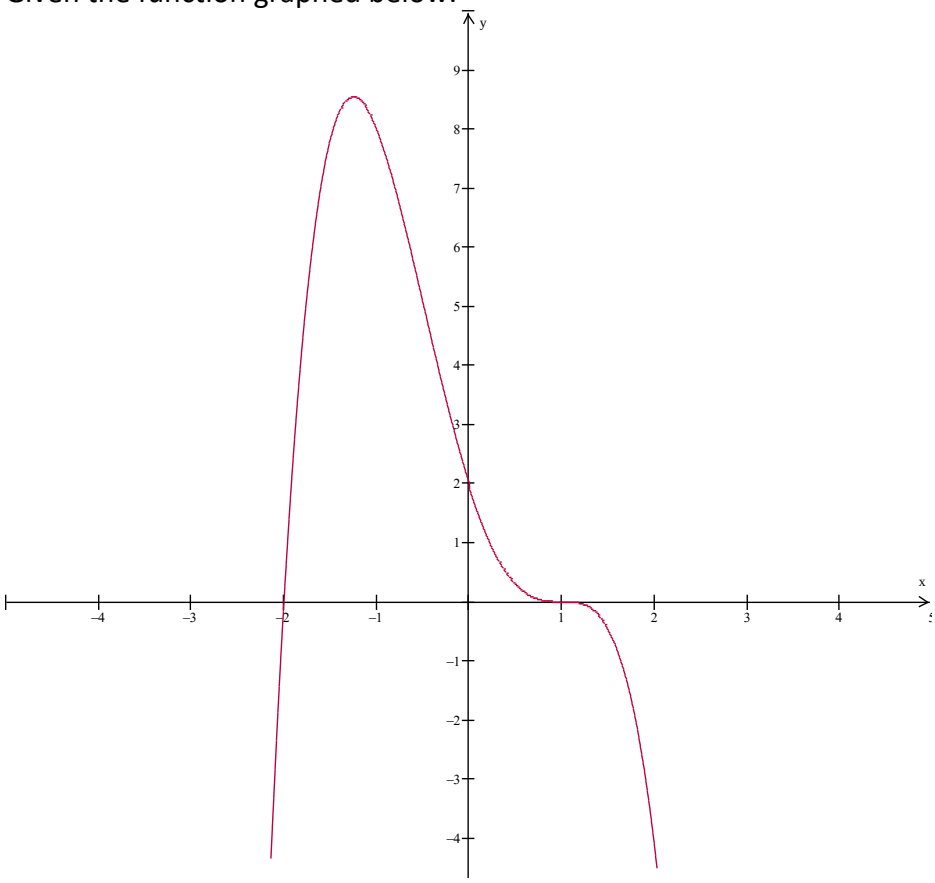
3. Given the function $y = ax^n + 2x + b$, what are the conditions on *a, n,* and *b* for this function to have a range of all real numbers where the curve extends from up into quadrant 2 and down into quadrant 4 and has a positive *y* intercept? (3 marks)

$a < 0$

n is odd

$b > 0$

4. Given the function graphed below:



a) What degree is this function? (1 mark) 4

b) Is the leading coefficient positive or negative? (1 mark) NEGATIVE

c) How many different roots does this function have? (1 mark) 2

d) The equation of the polynomial function. (2 marks)

$y = -(x+2)(x-1)^3$

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5. Given the function $f(x) = x^3 + 3x^2 - x - 3$ (4 marks)

a) Degree and end- behavior: 3 ← 1 mark
LEFT: DOWN QUAD 3 RIGHT: UP Q 1 ½ mark each

b) The zeros and their multiplicity: $-3, -1, 1$ ALL MULTIPLICITY OF 1

c) The y-intercept: -3

1	1	3	−1	−3
		1	2	−3
x	1	2	−3	0

$(x+1)(x^2+2x-3)$

$(x+1)(x+3)(x-1)$

6. Determine the quotient: (3 marks)

$$(2x^3 + x^2 - 2x + 1) \div (x + 2)$$

$$\begin{array}{r} 2x^2 - 3x + 4 \\ x+2 \overline{)\,2x^3 + x^2 - 2x + 1} \\ \underline{2x^3 + 4x^2} \\ -3x^2 - 2x \\ \underline{-3x^2 - 6x} \\ 4x + 1 \\ \underline{4x + 8} \\ -7 \end{array}$$

2	2	1	−2	1
		4	−6	8
x	2	−3	4	−7

$= 2x^2 - 3x + 4 \quad \frac{-7}{x+2}$

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7. Use the remainder theorem to determine the remainder when $-x^2 + 2x + 1$ is divided by $x + 2$. (1 mark)

$R = -(-2)^2 + 2(-2) + 1$

$= -4 - 4 + 1$

$= -7$

8. When $x^3 + x^2 + kx - 15$ is divided by $x - 2$, the remainder is 3. Determine k. (2 marks)

$2^3 + 2^2 + 2k - 15 = 3$

$8 + 4 + 2k = 18$

$2k = 6$

$k = 3$

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9. For the function $f(x) = x^3 - 13x^2 + 12$

a) List the possible integral factors. (1 mark)

$\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

b) Factor fully. (2 marks)

$$\begin{array}{r|rrrr} -1 & 1 & -13 & 0 & 12 \\ & & -1 & 12 & 12 \\ \hline & 1 & -12 & -12 & 0 \end{array}$$

$(x-1)(x^2 - 12x - 12)$

10. Prove that $x^2 + 5x + 6$ is a factor of the polynomial:
$P(x) = x^4 + 5x^3 + 2x^2 - 20x - 24$ (3 marks)

$x^2 + 5x + 6 = (x+3)(x+2)$

$P(-3) = 0$

$P(-2) = 0$

$\therefore$ SINCE BOTH ARE FACTORS, THEIR PRODUCT WILL BE A FACTOR

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