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Student Name: _____ Class: _____

Revision Worksheet

Grade 10 Advanced Mathematics (2019-2020)

Chapter 1 – Linear Systems and Matrices

Instructions: Read all questions carefully. Answer all questions.

Remainder Theorem: If a polynomial $P(x)$ is divided by $(x - a)$, then the remainder is $P(a)$.

Factor Theorem: The binomial $(x - r)$ is a factor of the polynomial $P(x)$ if and only if $P(r)=0$

Complex Conjugate Theorem : If $a+bi$ is a zero of a function then $a - bi$ is also a zero.

Integral Zero theorem: If the coefficients of a polynomial function are integers such that $a_0 = 1$, and $a_n = 0$, any rational zeros of the function must be factors of a_n .

Rational Zero Theorem: If $P(x)$ is a polynomial function with integral coefficients, then every rational zero of $P(x) = 0$ of the form $\frac{p}{q}$, a rational number in simplest form, where p is a factor of the constant term and q is a factor of the leading coefficient.

Chapter 3.1

1) Determine whether each expression is a polynomial. If it is a polynomial, state the degree of the polynomial.

a) $3x^4 + 5x - 6$

b) $\frac{x}{y} - 3$

c) $5x^{-3} + 7x - 11$

2) Simplify each expression:

a) $(2x^2 - 3x - 5) - (5x^2 - 7x + 8)$

b) $(a + b)(a^2 - ab^2 + 1)$

c) $\frac{15x^5 y^4}{3x^3 y}$

d) $(3n - 2)^3$

3) If $3^{k+3} = 9^{2k-5}$, What is the value of K?

Chapter: 3.2

4) Simplify $\frac{6x^3y - 3xy^2 + x^4y^4}{xy}$

5) Use Synthetic division to find $(x^3 + 4x^2 - 11x - 30) \div (x - 3)$

6) Simplify: $(2x^3 - 5x^2 - 28x + 15)(x + 3)^{-1}$

Chapter: 3.3

7) State the degree and leading coefficients of the polynomials:

a) $9x^5 - 4x^3 - 5x - 11$

b) $-y^4 - 3y^3 - 2y + 8$

8) Find $P(-2)$ and $P(3)$ for the function: $P(x) = x^3 - 2x^2 - 3x + 5$.

- 9) If $c(x) = x^2 - 3x + 5$ and $d(x) = 5x - 2$
Find the value of $c(3a)$, $d(x + 2)$ and $c(x + 3)$.

- 10) State the degree and describe the end behavior of the function:

$$f(x) = x^3 + 3x^2 - 4x$$

Chapter: 3.4

- 11) Graph the polynomial functions by making a table of values.

Determine the consecutive integer values of x between which each real zero is located.
Estimate the X -coordinates at which the relative maxima and minima occur.

a) $h(x) = x^3 - 4x^2 - 7x + 10$

b) $f(x) = x^3 - 3x^2 - 4x + 12$

12) Sketch the graph of polynomial functions with the following characteristics.

a) An odd function with zeros at $-4, -2, 0, 2, 4$

b) An even function with zeros at $1, -2, 3$ and 5 .

Chapter 3.5

13) Factor completely. If the polynomial is not factorable, write Prime.

a. $12ax^2 - 20cy^2 - 18bx^2 - 10ay^2 + 15by^2 + 24cx^2$

b. $x^{3y^2} - 8x^{3y} + 16x^3 + y^5 - 8y^4 + 16y^3$

14) Solve the equations:

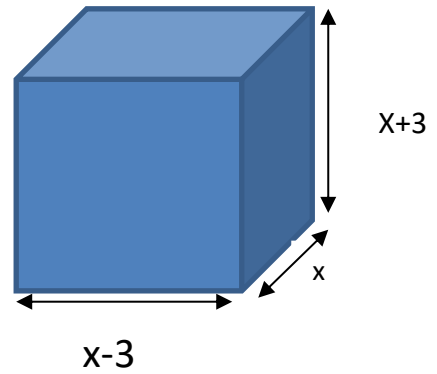
a. $x^3 + 216 = 0$

b. $x^4 + 6x^2 - 91 = 0$

c. $16x^{10} + 2x^5 + 6 = 0$

d. $4x^4 - 5x^2 - 6 = 0$

15) The volume of the figure at the right is 440 cubic Centimeters. find the value of x and the length, height and width.



Chapter 3.6

16) Use synthetic substitution to find $f(-5)$ and $f(2)$

a. $f(x) = x^6 - 4x^4 + 3x^2 - 10$

b. $f(x) = 3x^4 + x^3 - 2x^2 + x + 12$

17) Find the remaining factors of the polynomial

a. $x^4 + 2x^3 + 2x^2 - 2x - 3; x - 1$

18) A motor boat traveling against waves accelerates from position. Suppose the speed of the boat in meters per second is given by the function

$$f(t) = -0.04t^4 + 0.8t^3 + 0.5t^2 - t, \text{ where } t \text{ is the time in seconds.}$$

a. Find the speed of the boat to travel at 1, 2, and 3 seconds.

b. It takes 6 seconds for the boat to travel between two buoys while it is accelerating. Use synthetic substitution to find $f(6)$ and explain what this means.

19) Find value of k so that remainder is 3 for $(x^2 - x + k) \div (x - 1)$

Chapter 3.7

20) Solve each equation. State the number and type of roots.

a. $x^5 - 8x^3 + 16x = 0$

b. $16x^4 - 81 = 0$

21) State the possible number of positive real zeros, negative real zeros, and imaginary zeros of function $-x^5 + 14x^3 + 18x - 36 = 0$

22) Find all zeros of the function $f(x) = x^4 + 6x^3 + 73x^2 + 384x + 576$

23). Write a polynomial function of least degree with integral coefficients that have the zeros -2, -3, 4-3i

24) A computer manufacturer determines that the profit for producing x computers per day is

$$P(x) = -0.006x^4 + 0.15x^3 - 0.05x^2 - 1.8x$$

- a. how many positive real zeros, negative real zeros, and imaginary zeros exist?
- b. What is the meaning of the zeros in this situation?

Chapter 3.8

25) Find all the rational zeros of the function $f(x) = 2x^4 + 11x^3 + 26x^2 + 29x + 12$

26) Find all the zeroes of function $f(x) = 8x^3 + 14x^2 + 11x + 3$

27) Hiyam is building a storage box that is shaped like a rectangular prism. It will have a volume of 96 cubic meters. Using the diagram below, find the dimensions of the box.

