ALBERTA DISTANCE LEARNING CENTRE
Mathematics 30-1
MAT3791
Workbook 1.2

Student's Questions and Comments

FOR STUDENT USE ONLY

Student Name:

_____

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Assigned to

_____

Marked by

_____

Date received

_____

Summary

	Marks Earned	Total Marks	Percent
Practice 1.2A	**I have ____ /8 and ____%**		
Practice 1.2B	**I have ____ /8 and ____%**		
Practice 1.2C	**I have ____ /8 and ____%**		
Practice 1.2D	**I have ____ /8 and ____%**		
Explore Your Understanding 1.2			

Teacher's Comments:

_____

Teacher's Signature

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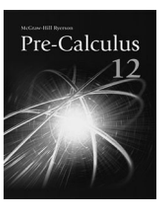

Pre-Calculus 12
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Explore Your Understanding Assignment 1.2

This assignment includes 18 marks. You are expected to complete **15 marks** worth of work. If you complete more than this, all completed questions will be used to assign a grade. For example, if you complete all 18 marks worth of work, your assignment total will be 18 instead of 15. You can also complete a question and label it "DO NOT MARK" if you are not confident in your work. Your teacher will then give feedback on your response, which will help clarify any misconceptions, but will not count it towards your required mark total. Please contact your teacher if you have any questions.

1. A corresponding long division and synthetic division are shown.

$$
\begin{array}{r}
x^2+x-6 \\
x+1\overline{)\,x^3+2x^2-5x+7} \\
\underline{x^3+x^2} \\
x^2-5x \\
\underline{x^2+x} \\
-6x+7 \\
\underline{-6x-6} \\
13
\end{array}
$$

$$
\begin{array}{r|cccc}
1 & 1 & 2 & -5 & 7 \\
 & & 1 & 1 & -6 \\
\hline
 & 1 & 1 & -6 & 13
\end{array}
$$

(2) a. Complete the table so the long division and the synthetic division show the same stage of progress. Your solutions will be partially complete divisions.

Long Division	Synthetic Division
$\begin{array}{r} x^2+x-6 \\ x+1\overline{)\,x^3+2x^2-5x+7} \\ \underline{x^3+x^2} \\ x^2-5x \\ \underline{x^2+x} \\ -6x+7 \end{array}$	
Long Division	**Synthetic Division**
	$\begin{array}{r\|cccc} 1 & 1 & 2 & -5 & 7 \\ & & 1 & & \\ \hline & 1 & & & \end{array}$

(1) b. Express the division in the form $\frac{P(x)}{x-a} = Q(x) + \frac{R}{x-a}$.

(1) c. How does the remainder compare to $\frac{R}{x-a}$? What does the remainder of this division represent?

(3) 2. Determine the zeros of $P(x) = x^4 + 3x^3 - 15x^2 - 19x + 30$ by factoring.

3. This question is designed to generate understanding for why the remainder theorem and factor theorem work.

(1) a. Show that $\frac{P(x)}{x-a} = Q(x) + \frac{R}{x-a}$ can be rearranged to $P(x) = Q(x)(x-a) + R$.

(1) b. Evaluate $P(a)$, showing it simplifies to R.

(1) c. How does the answer in part b. relate to the remainder theorem?

(1) d. Use $P(x) = Q(x)(x-a) + R$ to explain the factor theorem. (Hint: What is the value of R if there is no remainder? Substitute this value for R into $Q(x)(x-a) + R$ to show $x-a$ is a factor of $P(x)$.)

4. Function f, has the following properties:
   - The graph of $y = f(x)$ extends down into quadrant III and down into quadrant IV.
   - The zeros of f are -2, 3, and 5.
   - The degree of $f \leq 5$.

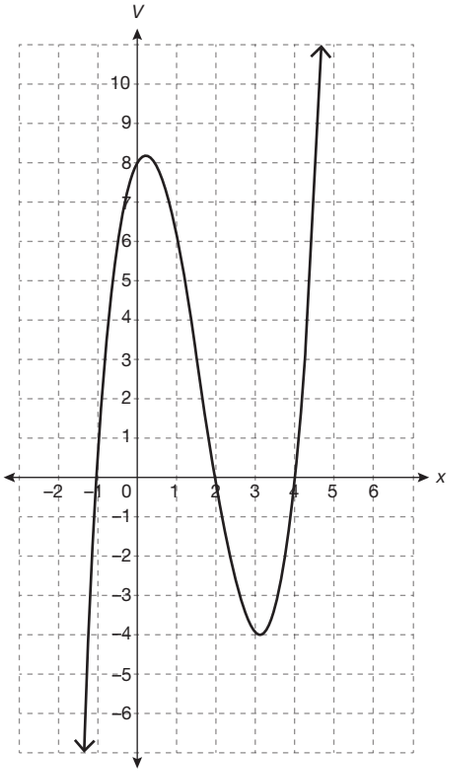
(1) a. What degree(s) is/are possible for f? Explain.

(1) b. What are the maximum and minimum multiplicities possible for a zero of f? Explain.

(1) c. Sketch two possible graphs of $y = f(x)$.

(1) d. State two possible equations for f.

5. A cube with side length x has been modified by adjusting its length, width, and height. A student determined a function of the form $V(x) = (x + a)(x + b)(x + c)$ can be used to represent the volume of the new box for different values of x, and then she graphed the function.

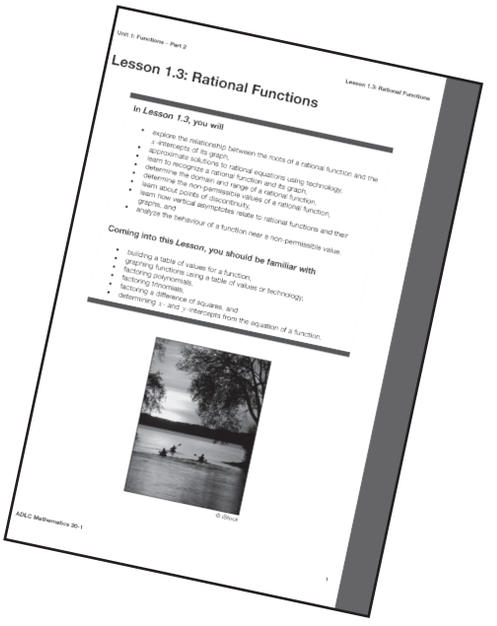


(1) a. Based on the graph, predict how the side lengths of the original cube changed. (Hint: What do the zeros of the function represent?)

(1) b. Determine a polynomial function of the form $V(x) = (x + a)(x + b)(x + c)$ that matches the function in the graph.

(1) c. Which part(s) of the graph are realistic? Explain. (Hint: All side lengths must be positive. Using two negative side lengths to give a positive volume is not realistic.)

When this workbook is complete, submit it using a method described at the beginning of this *Workbook*. Next, complete *Test Your Understanding Quiz 1.2* online in Moodle. When complete, return to the *Module* and begin *Lesson 1.3.*


Unit 1: Functions - Part 2

Lesson 1.3: Rational Functions

Lesson 1.3: Rational Functions

In *Lesson 1.3*, you will

- explore the relationship between the roots of a rational function and the x-intercepts of its graph,
- approximate solutions to rational equations using technology,
- learn to recognize a rational function and its graph,
- determine the domain and range of a rational function,
- determine the non-permissible values of a rational function,
- learn about points of discontinuity,
- learn how vertical asymptotes relate to rational functions and their graphs, and
- analyze the behaviour of a function near a non-permissible value.

Coming into this *Lesson*, you should be familiar with

- building a table of values for a function,
- graphing functions using a table of values or technology,
- factoring polynomials,
- factoring trinomials,
- factoring a difference of squares, and
- determining x- and y- intercepts from the equation of a function.

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