Pearson Institute of Higher Education

PRE-DEGREE FOUNDATION PROGRAMME

MATHEMATICS FOR DEGREE STUDIES

FPMC021

Examination – November 2016

Internal Examiner:	King Wun Vincent Leung
External Examiner:	Andrew Mkolesia
Total Marks:	150 Marks
Duration:	3 Hours
Sub-Minimum:	40%

Section A:	Multiple Choice	30 Marks
Section B:	Calculations	85 Marks
Section C:	Calculations	35 Marks

Instructions to Candidates:

1. Read each question carefully.
2. You must answer ALL sections.
3. Answer all questions in the answer book provided, except for Section A (Multiple Choice Question) must be answered on the MCQ answer sheet.
4. All rough work should be done in the back of the answer book and indicated as such.
5. This examination paper should not be removed from the examination venue.
6. A non-programmable Calculator may be used for this test.

NB This examination paper consists of 11 pages

Section A

Multiple Choice 2 mark(s) per question 30 Marks

On the MCQ answer sheet provided, make a cross (X) over the alternative (a – e) that you have chosen for each question. There is only one right answer. There is no negative marking, but it will not be marked if you did not answer on the MCQ answer sheet.

Question One

If $-15x - 3y = 12$ is a function, Determine the value of the gradient.

a. $m = -5$

b. $m = 5$

c. $m = 4$

d. $m = -4$

e. $m = \frac{1}{4}$ (2)

Question Two

If $7y = 13x + 16$ is a function, Determine the value of the *y*-intercept.

a. $y\text{-int} = 16$

b. $y\text{-int} = -16$

c. $y\text{-int} = \frac{7}{16}$

d. $y\text{-int} = -\frac{16}{7}$

e. $y\text{-int} = \frac{16}{7}$ (2)

Question Three

Which of the following relation is not a function.

a. $\{(x^3 + 1; y + 1), (x^4 + 1; y + 1), (x + 3; y + 3)\}$

b. $\{(x^2 - 1; y - 1), (x - 2; y - 2), (x - 3; y - 3)\}$

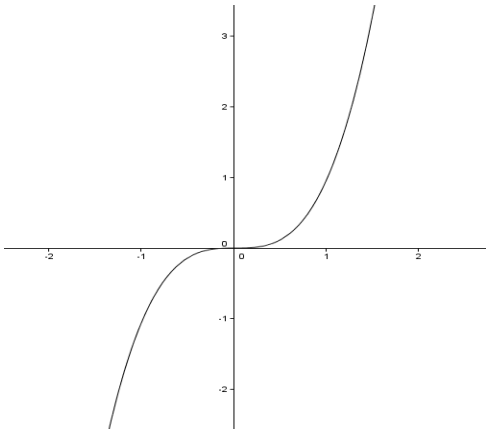
c. $\{(x^2 - y; y^2 - x), (x^3 - y; y^3 - x), (x^4 - y; y^4 - x)\}$

d. $\{\left(\frac{x^5}{x}; \frac{y^2}{y}\right), \left(\frac{x^5}{x^2}; \frac{y^3}{y^2}\right), \left(\frac{x^4}{x}; \frac{y^4}{y^3}\right)\}$

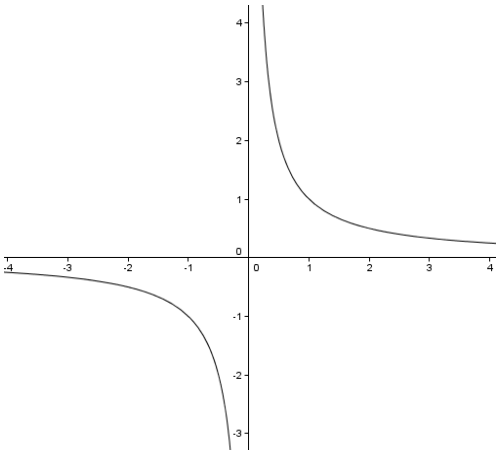
e. $\{\left(\frac{x^2+1}{y}; \frac{y^2-1}{x}\right), \left(\frac{x^2+2}{y}; \frac{y^2-2}{x}\right), \left(\frac{x^2+3}{y}; \frac{y^2-3}{x}\right)\}$ (2)

Question Four

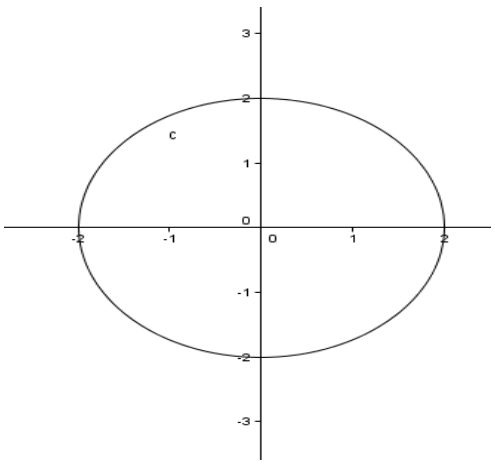
1)



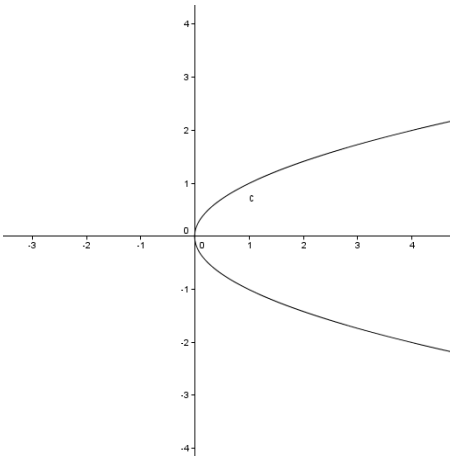
2)



3)



4)



Which of the above graphs represents not a function?

a. Graph One and Two

b. Graph Two and Three

c. Graph Three and Four

d. Graph Four and One

e. None of the graph (2)

Question Five

Find the slope of the straight line passing through the given pair of points $(-12; 3)$ and $(14; 8)$.

a. $-\frac{5}{26}$

b. $\frac{5}{26}$

c. $\frac{26}{5}$

d. $-\frac{26}{5}$

e. None of the above. (2)

Question Six

Which of the terminology best represent the definition below:

_____ is the set of all the second elements (*abscissa)* of the ordered pairs (the permitted *x* values if graphing the relations).

a. Variable
b. Range
c. Ordered-pair
d. Domain
e. Function (2)

Question Seven

If two lines $11y - 9x = 11$ and $21y + ax = 24$ are parallel, then $a =$ _____

a. $a = -\frac{11}{189}$
b. $a = \frac{11}{189}$
c. $a = \frac{189}{-11}$
d. $a = \frac{189}{11}$
e. None of the above. (2)

Question Eight

Find the missing coordinate to complete the ordered-pair solution of $(?; -8)$ for equation $3x - 2y = 23$.

a. $(\frac{3}{7}; -8)$
b. $(-\frac{3}{7}; -8)$
c. $\left(\frac{23}{-2}; -8\right)$
d. $(\frac{7}{-3}; -8)$
e. $(\frac{7}{3}; -8)$ (2)

Question Nine

In order to solve for $x^2 + 15x + 56 = 0$, which of the following method may **not** be used.

a. K – method
b. Quadratic formula method
c. Completing the Square method
d. Square root method
e. Graphical method (2)

Question Ten

Solve for x if $x^2 - 17x + 66 = 0$

a. $x = 11 \; or \; x = -6$
b. $x = 11 \; or \; x = 6$
c. $x = -11 \; or \; x = -6$
d. $x = -11 \; or \; x = 6$
e. None of the above. (2)

Question Eleven

Solve for x if $\frac{1}{8} + \frac{1}{11}(x - 3) = \frac{1}{2}(2x + \frac{1}{3})$

a. $x = \frac{-83}{8}$
b. $x = \frac{83}{8}$
c. $x = -\frac{83}{240}$
d. $x = \frac{83}{240}$
e. None of the above. (2)

Question Twelve

Solve for y if $6x - 3y + 9 = 0$

a. $-2x + 3 = y$
b. $-2x - 3 = y$
c. $2x - 3 = y$
d. $2x + 3 = y$
e. None of the above. (2)

Question Thirteen

Solve for x if $|4x + 5| \geq 3$

a. $-\frac{1}{2} \leq x$ OR $x \leq -2$

b. $-\frac{1}{2} \leq x \leq -2$

c. $-\frac{1}{2} \leq x$ AND/OR $x \leq -2$

d. $-\frac{1}{2} \leq x$ OR $x \leq -2$

e. $-\frac{1}{2} \geq x \geq -2$ (2)

Question Fourteen

Solve for x if $|2x + 6| \leq -14$

a. $x \leq -10$

b. $-4 \leq x \leq -10$

c. $-4 \leq x$ OR $x \leq -10$

d. $-4 \leq x$ AND/OR $x \leq -10$

e. None of the above. (2)

Question Fifteen

The sum of the geometric series $\frac{1}{5} + \frac{1}{30} + \frac{1}{180} +$ ... is _____

a. $\frac{3}{233}$

b. $\frac{1}{27000}$

c. $\frac{6}{25}$

d. 1

e. Infinity (2)

SUBTOTAL: [30]

Section B

Calculation Questions — 85 Marks

Answer the following questions in your answer book.

Question One

Given: $g(x) = -5x^2 - 3$ and $f(x) = 4x + 1$ Find

1.1 $g(1 - m)$ (4)

1.2 $\left[\frac{f}{g}\right](n + 3)$ (4)

1.3 $[g \cdot h](-3; -5)$ if $h(y) = 4y + 1$ (4)

[12]

Question Two

2.1 Complete a table of values for the function:

$$y = -3x^2 + 2x + 1 \text{ for } -3 \leq x \leq 4$$ (10)

2.2 Draw the graph of the function $y = -3x^2 + 2x + 1$ by using the table of values in question 2.1 above. Use the graph paper provided using the scale of 2cm to 1 unit on x-axis and 2cm to 5 units on y-axis. (5)

***NOTE: Your answer will not be marked if you do not draw your graph on the provided graph paper in your answer book*.**

[15]

Question Three

3.1 For the two equations $5x + 4y = 1$ and $3x - 6y = 2$.

Find the value of *x* and *y.* (4)

3.2 Consider the equations:

$$x + y - z = 1$$
$$8x + 3y - 6z = 1$$
$$-4x - y + 3z = 1$$

Find the values of x; y; and z (6)

[10]

Question Four

4.1 Solve the following quadratic equation by using factoring method:

$81x^2 - 121 = 0$ (4)

4.2 Solve the following quadratic equation by using *square root* method:

$x^2 - 49 = 0$ (4)

4.3 Solve the following quadratic equation by using *completing the square* method:

$x^2 - 13x + 30 = 0$ (4)

4.4 Solve the following quadratic equation by using a *quadratic formula*:

$2x^2 - 11x + 13 = 0$ (4)

4.5 Solve the following equation by treating it as a quadratic type of equation:

$x^4 - 3x^2 - 24 = 0$ (6)

[22]

Question Five

5.1 Solve each of these inequalities for x:

5.1.1 $|x-3| > 7$ (4)

5.1.2 $|x-4| \leq 43$ (4)

5.1.3 $|x-5| \geq -7$ (2)

5.2 Solve the inequalities below:

$16(4 - 2x) < 3x + 45$ (4)

[14]

Question Six

Find the nth term and the sum of the first n terms of each sequence for the indicated value of n.

6.1 $4{,}44;\ 5{,}94;\ 7{,}44 \ldots . n = 105$ (6)

6.2 $\frac{1}{5};\ \frac{1}{35};\ \frac{1}{245}; \ldots . n = 5$ (6)

[12]

SUBTOTAL: [85]

Section C

Calculation Questions — 35 Marks

Answer the following questions in your answer book.

Question One

The Table below provides the number of tomatoes sauce in liter used in a certain month by 19 randomly selected KFC.

32	24	18	14	40
22	27	31	28	27
21	37	27	13	26
23	34	40	29	

1.1 Calculate the mean of these tomatoes sauce figures. (2)

1.2 Find the inter-quartile and the semi-interquartile ranges of the above data. (4)

1.3 Calculate the standard deviation of these tomatoes sauce figures. (5)

1.4 By using the above data complete the table below:

Trip Intervals	Frequency	Midpoint (x)	fx	$f(x)^2$
1 – 10				
11 – 20				
21 – 30				
31 – 40				
	$\sum f =$	$\sum f(x) =$	$\sum fx =$	$\sum f(x)^2 =$

(20)

1.5 Use the information from the table above, calculate the Variance. (4)

SUBTOTAL: [35]

TOTAL: [150]

FORMULAE SHEET

General Formulae:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$T_n = a + \ (n-1)d$$

$$T_n = ar^{n-1}$$

$$s_n = \frac{n}{2}\{2a + (n-1)d\} \ or \ s_n = \frac{n}{2}\ (a + l)$$

$$s_n = \frac{a_1(1 - r^n)}{1 - r} \ or \ s_n = \frac{a_1(r^n - 1)}{r - 1} \ when \ r \ \neq 1$$

$$s_n = \frac{a_1 - a_n r}{1 - r} when \ r \ \neq 1$$

$$s_n = \frac{a}{1 - r}, as - 1 < r < 1$$

Statistic Formulae:

$$\mu = \frac{\sum x}{N}$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{\sum fx}{n} \ or \ \bar{x} = \frac{\sum fx}{\sum f}$$

$$s^2 = \frac{\sum (x - \bar{x})^2}{n - 1} \ or \ s^2 = \frac{\sum x^2 - n\bar{x}^2}{n - 1}$$

$$s^2 = \frac{\sum fx^2 - \frac{(\sum fx)^2}{n}}{n - 1} \ or \ s^2 = \frac{\sum fx^2 - n\bar{x}^2}{n - 1}$$

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}} \ or \ \ s = \sqrt{\frac{\sum x^2 - n\bar{x}^2}{n - 1}}$$

$$s = \sqrt{\frac{\sum fx^2 - \frac{(\sum fx)^2}{n}}{n-1}} \; or \; s = \sqrt{\frac{\sum fx^2 - n\bar{x}^2}{n-1}}$$

$$\frac{1}{4}(n+1)th\ term$$

$$\frac{3}{4}(n+1)th\ term$$

$$x_{max} - x_{min}$$

$$UQ - LQ$$

$$\frac{1}{2}(UQ - LQ)$$
