

INTI INTERNATIONAL UNIVERSITY
 FOUNDATION IN SCIENCE (CFSI)
 MAT 1210: MATHEMATICS 1
 FINAL EXAMINATION: MARCH 2016 SESSION

Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

a) Given that $P(x) = 5 - 2x$ and $Q(x) = 2x^3 - 2x^2 - 8x - 3$,

(i) Express $\frac{P(x)}{Q(x)}$ in partial fraction.

(12 Marks)

(ii) By using long division, divide $Q(x)$ with $P(x)$. Write your answer in fractional form.

(8 Marks)

b) If $x^{x\sqrt{x}} = (x\sqrt{x})^x$; $x \neq 0$, find the value of x .

(5 Marks)

Question 2

a) Solve the radical equation of $\sqrt{2x+11} = \sqrt{5x+1} - 1$ and check your answer.

(9 Marks)

b) By using implicit differentiation, differentiate $4x^2y^7 - 2x = x^5 + 4y^3$ respect to x .

(4 Marks)

c) Verify the identity $\sin 3x = \sin(2x + x) = 3\sin x - 4\sin^3 x$.

(6 Marks)

d) When $x^2 + 2px + 9$ is divided by $(x + 3)$, the remainder is 4. Find the value of p .

(4 Marks)

e) State the leading coefficient and degree of the polynomial $\sqrt{2x} - 0.5x^2 + \frac{1}{5}x^4$.

(2 Marks)

Question 3

a) Sketch $4y - 6x - 12 = 0$ and state the y, x intercepts and the slopes.

(5 Marks)

b) By using integration by parts, evaluate the definite integral of $\int_0^1 x^2 e^x dx$.

(10 Marks)

c) Given the point $(-10, -2)$ on the terminal side of angle θ . Find the values of six trigonometric functions.

(10 Marks)

Question 4

a) Evaluate the indefinite integral of $\int (2x + 2)e^{x^2 + 2x + 3} dx$ by using integration by substitution.

(6 Marks)

b) Given that $f(x) = \frac{x^2 + 2}{x}$; $g(x) = \frac{5}{1 - 3x^2}$ and $h(x) = \sqrt{x - 1}$. Find;

(i) $h^{-1}(x)$.

(4 Marks)

(ii) $fgh(x)$, and simplify your answer.

(7 Marks)

c) Find the coordinates of turning points of the curve $y = 2x^3 + 3x^2 - 12x$. Hence, determine the nature of the turning points.

(8 Marks)

Question 5

a) Use the binomial theorem to expand $\left(x + \frac{1}{x}\right)^6$.

(3 Marks)

b) Find the derivatives of $y = \cot^4(x^3) \sec^2(2x)$.

(6 Marks)

c) Find all the roots of $P(x) = 3x^3 + 11x^2 + 12x + 4$.

(12 Marks)

d) Find the area enclosed by the graph $y = \frac{1}{x^2}$ and the x -axis and the lines $x=1$ and $x=3$ as shown in diagram below;

(4 Marks)

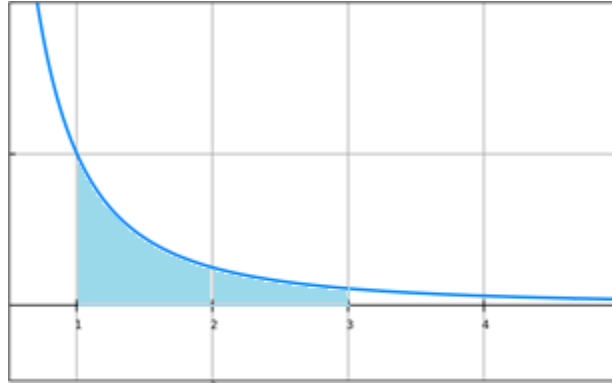


Diagram 1

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