PIONEER INTERNATIONAL UNIVERSITY

THE DEGREE OF BACHELOR OF EDUCATION

UNIT CODE: MATH 2111

UNIT TITLE: CALCULUS 2

END OF SEMESTER EXAMINATION

DATE: DECEMBER, 2021 Time: 2 HOURS

INSTRUCTIONS

1. Answer question **ONE (1)**and any other **TWO (2)** questions
2. Show all your workings
3. Scientific Calculators and non-programmable calculators may be used

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1. (a) Find the derivative of the function $y = cosx^3$ (**3** *marks*)

   (b) Evaluate: $\int (3x+2)^5 dx$

   (**5** *marks*)

   (c) Find $f'(x)$ using implicit differentiation:

   i. $f(x) = x^2 + 2xy + 2y^2 = 1$ (**5** *marks*)

   ii. $f(x) = x^2 + y^2 - 2x - 4y = 1$ (**5** *marks*)

   (d) Using the identity property: $sin^2x + cos^2x = 1$, evaluate $\int cos^5 dx$

   (**6** *marks*)

   (e) Find the derivatives for the set of functions given below.

   i. $x = sin\,2t$;
   $y = -cos\,t$

   ii. $x = e^2t$;
   $y = e^3t$

   (**6** *marks*)

2. (a) Integrate the following using substitution method:

$$\int x\sqrt{2x+1}dx$$

   (**7** *marks*)

   (b) Sketch the curve for the function $f(x) = \frac{1}{3}x^3 - x^2 + 3x + 4$ (**13** *marks*)

3. Evaluate

   (a) $\int sinh\, x\, cosh^2\, x\, dx$ (**10** *marks*)

   (b) $\int cos^4\, 2x\, dx$ (**10** *marks*)

4. (a) Find the area below $f(x) = -x^2 + 4x + 3$ and above $g(x) = -x^3 + 7x^2 - 10x + 5$ over the interval $1 \leq x \leq 2$

   (**8** *marks*)

   (b) Find the integral of the function $f(x) = sin^4\, x\, cos^4\, x$

   (**12** *marks*)