2016/2017 SEMESTER 1 MID-TERM TEST

MA1521 Calculus for Computing

September/October, 2016

12:30pm to 1:30pm

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. This test paper consists of **TEN (10)** multiple choice questions and comprises **TWO (2)** pieces of paper printed on **both sides**.
2. Answer all 10 questions. 1 mark for each correct answer. No penalty for wrong answers. Full mark is 10.
3. All answers (Choices A, B, C, D, E) are to be submitted using the pink form (FORM CC1/10).
4. Use **only 2B pencils** for FORM CC1/10.
5. On FORM CC1/10 (section B), **write** your **matriculation number** and **shade** the corresponding numbered circles **completely**. Your FORM CC1/10 will be graded by a computer and it will record a **ZERO** for your score if your matriculation number is not correct.
6. Write your full name in section A (under Module Code) of FORM CC1/10.
7. Only circles for answers 1 to 10 are to be shaded.
8. For each answer, the circle corresponding to your choice should be **properly** and **completely** shaded. If you change your answer later, you must make sure that the original answer is properly erased.
9. For each answer, **do not shade more than one circle**. The answer for a question with more than one circle shaded will be marked wrong.
10. **Do not fold** FORM CC1/10.
11. Submit FORM CC1/10 before you leave the test hall.

1. Let $y = \ln(1 + x^2)$. Then $\frac{dy}{dx} =$

   (A) $\frac{2x}{1+x^2}$

   (B) $\frac{x}{1+x^2}$

   (C) $\frac{-2x}{1+x^2}$

   (D) $\frac{-x}{1+x^2}$

   (E) None of the above

2. A light shines from the top of a lamp post 20 m high. A ball is dropped from the same height from a point 15 m away from the light. It is known that the ball falls a distance $s = 5t^2$ m in t seconds. Find the speed of the shadow of the ball on the ground 1.3 seconds later. Give your answer correct to one decimal place.

   (A) 43.8 m/sec.

   (B) 61.5 m/sec.

   (C) 38.9 m/sec.

   (D) 54.6 m/sec.

   (E) None of the above

3. If $x^3 + y^3 = 6xy$, find the value of $\frac{d^2y}{dx^2}$ when $x = y = 3$.

   (A) $-\frac{16}{3}$

   (B) $-\frac{10}{3}$

   (C) $-\frac{20}{3}$

   (D) $-\frac{8}{3}$

   (E) None of the above

4. It is known that the graph of $y = \frac{1}{x^2+2x+1521}$ has a point of inflection at $x = a$, where a is positive. Find the value of a. Give your answer correct to one decimal place.

   (A) 20.5

   (B) 22.5

   (C) 21.5

   (D) 23.5

   (E) None of the above

5. Let $y = t^3 + 2t^2 - t + 5$ and $x = t^2 + t + 1$. Find the value of $\frac{dy}{dx}$ when $t = 2$.

   (A) $\frac{23}{7}$

   (B) $\frac{16}{5}$

   (C) $\frac{20}{7}$

   (D) $\frac{19}{5}$

   (E) None of the above

6. $\int (\sec(1-2x))(\tan(1-2x))\,dx = ?$

   (A) $-\frac{1}{2}\sec(1-2x) + C$

   (B) $\frac{1}{2}\sec(1-2x) + C$

   (C) $-\frac{1}{4}\sec(1-2x) + C$

   (D) $\frac{1}{4}\sec(1-2x) + C$

   (E) None of the above

7. $\int_{\sqrt{3^{1521}-1}}^{\sqrt{3^{2016}-1}} (\frac{x}{1+x^2})dx = ?$ Give your answer correct to one decimal place.

   (A) 247.5

   (B) 271.9

   (C) 262.7

   (D) 285.6

   (E) None of the above

8. If $\int_1^{2^x} \frac{\sqrt{\ln t}}{t} dt = 1521$, find the value of x. Give your answer correct to the nearest integer.

   (A) 165

   (B) 250

   (C) 198

   (D) 268

   (E) None of the above

9. Find the area of the region in the first quadrant bounded by the x-axis, the y-axis, the curve $y = 1 + x^2$ and the line $x = 1$.

   (A) $\frac{2}{3}$

   (B) $\frac{3}{4}$

   (C) $\frac{3}{2}$

   (D) $\frac{4}{3}$

   (E) None of the above

10. Let a denote a positive constant. Let R denote the finite region in the first quadrant bounded above by the curve $y = ax^2$ and bounded below by the curve $y = x^3$. It is known that the volume of the solid generated by rotating R one complete round about the x-axis is equal to 20. Find the value of a. Give your answer correct to two decimal places.

    (A) 1.89

    (B) 1.99

    (C) 1.96

    (D) 1.86

    (E) None of the above

END OF PAPER