

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

MATH102 - Section 02 (Term 162)

Date: May 11, 2017

Test 5

Duration: 50 minutes

Family Name: _____ ID #: _____ Serial #: ____

1. Find the *arc length* of the curve $y = \ln(\cos x)$ from the point $(0, 0)$ to the point $(\pi/3, -\ln 2)$. **(5 points)**

2. Find the arc length of the curve $y = x^2 - \frac{1}{8} \ln x$, where $1 \leq x \leq e$. **(5 points)**

3. Find the area of the surface obtained by rotating the curve $y = x^3$, $0 \leq x \leq 1$, about the x – axis. **(7 points)**

4. Find the area of the surface obtained by rotating the curve $x = \frac{1}{3}\sqrt{4 - 9y^2}$, $0 \leq y \leq 1/3$, about the y – axis. **(7 points)**

5. Determine whether the following *sequences* are convergent or divergent:

(a) $\left\{ \left(1 - \frac{2}{n}\right)^n \right\}_{n=1}^{\infty}$

(b) $\left\{ (-1)^n \frac{n^2}{n^2 + n + 1} \right\}_{n=1}^{\infty}$

(c) $\left\{ (-1)^n \frac{3n^2 + 5}{n^3 - n^2 + 1} \right\}_{n=1}^{\infty}$

(4 + 4 + 4 = 12 points)

6. Find the exact value of the following series:

(a)
$$\sum_{n=0}^{\infty} \frac{(-1)^n + 2^{n+1}}{3^n}$$

(b)
$$\sum_{n=1}^{\infty} \frac{2}{n^2 + n}$$

(6 + 6 = 12 points)