KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

MATH102 - Section 02 (Term 162)

Date: April 16, 2017 **Test 4** Duration: 50 minutes

Family Name: _____ **ID #:** _ _ _ _ _ _ _ _ _ **Serial #:** _ _

1. Use the method of *Cylindrical Shells* to find an integral represents the volume of the following solids (DO NOT evaluate the integral):

   (a) The solid generated by revolving the region bounded by the curves:

   $$y = x^2 - x^3, \text{ and } y = 0$$

   about the line $x = -1$.

   (b) The solid generated by revolving the region bounded by the curves:

   $$y = 4 - x^2, \text{ and } x = y - 2$$

   about the line $y = 4$.

(6 + 6 = 12 points)

2. Use Partial fractions to evaluate the following integrals:

(a) $\int \frac{x^2 + 2x - 1}{2x^3 + 3x^2 - 2x} dx$

(b) $\int \frac{3x^3 - 3x^2 + 4}{x^2 - x} dx$

(a) $\int \frac{-x^2 + x + 1}{x^3 + x} dx$

(8 + 8 + 8 = 24 points)

3. Determine the value of the following ***improper integrals***:

(a) $\int_e^{\infty} \frac{1}{x(1+\ln x)^2}\,dx$

(b) $\int_{-1}^{1} \frac{1}{\sqrt{|x|}}\,dx$

(7 + 7 = 14 points)