

King Fahd Univ. of Petroleum and Minerals  
Faculty of Sciences  
Department of Mathematical Sciences

MAJOR No. 1  
(MATH. 102-051 Section 4)

**Name:**

**ID:**

**Important instructions:**

- Use an HB pencil or a pen (do not use red color)
- Solve the problems completely
- Write down your answers in a clear manner
- Justify all your steps
- Use the back of the page (verso) only for scratching

**Prob. 1**

Solve the initial value problem

$$\frac{dx}{dt} = \frac{t^2-1}{t^2+1}, x(1) = \pi/2$$

**Prob. 2**

Solve the initial value problem

$$\frac{dw}{dz} = (2z - 5z^2 + z^3)\sqrt{z^3}, w(0) = 1$$

**Prob. 3**

Compute the integral

$$\int \frac{dx}{\sqrt{x}e^{\sqrt{x}}}$$

**Prob. 4**

Find

$$\int \frac{dt}{t\sqrt{3t^2 - 4}}$$

**Prob. 5**

Find the integral

$$\int \frac{dx}{\sqrt{x}(1+x)}$$

**Prob. 6**

Find the

(a) left-end approximation

(b) right-end approximation

(c) midpoint approximation

for the area delimited by:  $f(x) = 5x - 3x^2$ ,  $a = -1$ ,  $b = 3$ ,  $n = 4$

(d) find the exact area

**Prob. 7**

Compute  $\int_0^{10} \sqrt{10u - u^2} du$