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

MAJOR No. 2  
(MATH. 102-042 Sections 1 & 2)  

Name:  
ID:  

Prob. 1  
Find the exact arc length of the curve $24xy = y^4 + 48$ from $y = 2$ to $y = 4$
Prob. 2
Find the volume of the region bounded by $y = x^2$, $y = 2 - x$ and $x = 0$ revolved about the 
a) $x-$axis 
b) $y-$axis 
c) $y = 2$. 
Prob. 3

The integral represents the volume of a solid. Sketch the region and axis of revolution that produce the solid.

a) \( \int_{0}^{2} \pi (2x - x^2)^2 \, dx \)

b) \( \int_{0}^{1} \pi \left[ (\sqrt{y})^2 - y^2 \right] \, dy \)

c) \( \int_{0}^{2} 2\pi x(x - x^2) \, dx \)

d) \( \int_{0}^{2} 2\pi (4 - y)(y + y) \, dy \)
Prob. 4
Find the integral
\[ \int \frac{dx}{\sqrt{9 + x^2}} \]
Prob. 5
Find
\[ \int \sqrt{\sin x \cos^5 x} \, dx \]
Prob. 6
Compute \( \int \frac{2x^2 - 5x + 2}{x^3 + x} \, dx \)