

King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Math 102 (Calculus II)
Major Examination II (Sec.#: 4 & 8)
Semester II, 2004–2005(042)
April 27, 2005

Time: 90 Minutes

Grade: _____/60

Name: _____ Section #: _____

ID #: _____ Serial #: _____

1. Show complete and neat work for full credit.
2. This exam consists of 10 pages.

Q1. Use cylindrical shell method to find volume of the solid generated when the region bounded by the curves $y = x^3 + 1$, $x + 2y = 2$, $x = 2$ is revolved about the y -axis.
(10 points)

- Q2. (a) Find a vertical line $x = k$ that divides the area enclosed by $x = \sqrt{y}$, $x = 4$ and $y = 0$ in two equal parts. (2 points)

- (b) The region bounded by the graphs of $y = x^{2/3}$ and $y = x^2$ is rotated about the line $y = -2$. Set up an integral to find volume of the solid of revolution by the washers method. (3 points)

Q3. Find the area of the surface generated by revolving the curve $y = \frac{x^3}{3} + \frac{1}{4x}$,
 $1 \leq x \leq 3$, about the x -axis. (5 points)

Q4. Evaluate

(a) $\frac{d}{dx}(x^2 \operatorname{cosec} h e^{4x})$.

(2 points)

(b) $\int \sinh x \operatorname{sech}^2 x \, dx$.

(3 points)

Q5. Evaluate $\int 3x^7 \sin 2x \, dx$.

(5 points)

Q6. Evaluate

(a) $\int \sqrt{\tan \theta} \sec^4 \theta \, d\theta.$

(5 points)

(b) $\int_0^{\pi/2} \sin 3x \cos 2x \, dx.$

(5 points)

Q7. Evaluate $\int \frac{\sqrt{3} dx}{x^4 \sqrt{x^2 + 3}}$.

(5 points)

Q8. Use partial fractions to evaluate: $\int \frac{x^3 + 6x^2 + 3x + 6}{x^3 + 4x} dx$. (5 points)

Q9. Evaluate $\int \frac{5 dx}{4 \sin x - 3 \cos x}$.

(10 point)