

**King Fahd University of Petroleum and Minerals**  
Department of Mathematical Sciences  
MATH 102(Calculus II)(042)  
Major Examination I (Sec#: 4 and 8)  
March 16,2005

Time : 90 Minutes

Grade : ...../60

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Name: \_\_\_\_\_ Section#: \_\_\_\_\_

ID#: \_\_\_\_\_ Serial#: \_\_\_\_\_

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(1) Show complete and neat work for full credit.

(2) This is exam consists of  pages.

Q.1 Use summation notation to find the area of the region bounded by the graph of  $f(x) = 9 - x^2$  over the interval  $[0,3]$ .

(10 Points)

Q.2 (i) Evaluate:  $\int x\sqrt{9-x^2} dx$ .

(2 Points)

(ii) Evaluate:  $\int \sin^3 4\theta d\theta$ .

(3 Points)

Q. 3 Let  $f(x) = \begin{cases} \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

Check whether or not  $f$  is integrable on  $[-1,1]$ .  
Give reasons in support of your answer.

(10 Points)

Q.4 Explain whether the calculations are valid:

$$(i) \int_0^{\pi} \cos^2 x \, dx = \frac{\pi}{2}$$

$$(ii) \int_0^4 \frac{dx}{(x-2)^2} = -1$$

(5 Points)

(i)

(ii)

Q. 5 Evaluate :  $\int_1^{\sqrt{3}} \frac{x}{3+x^4} dx$

(5 Points)

Q.6 Use mean value theorem for integrals to evaluate  $\int \sqrt{x} dx$  over the interval  $[0, 9]$ .

(5 Points)

Q. 7 Let  $F(x) = \int_{5x}^{x^3} \frac{\cos t^2}{t^4 + 3} dt$ .

Find  $F'(0)$ .

(5 Points)



Q. 8 Find area of the region bounded by the graphs of the curves  $y = 6 - x^2$  and  $y = -2x + 3$ .

(5 Points)

Q.9 Draw a sketch of the region  $R$  enclosed by the curves  $y = 2 + |x - 1|$  and  $y = -\frac{x}{5} + 7$ .  
Find area of the region  $R$ .

(10 Points)