King Fahd University of Petroleum and Minerals
Department of Math & Stat
MATH 102, Term 102
Major Exam 2

Name: _____ _____

ID #: _____ Section #: _____

Problem No. #	Grade	Maximum Points
1		6
2a		6
2b		6
3		12
4		8
5		8
6		9
7		14
8		12
9		9
10		10
Total		100

1. (6 points) Find all positive numbers b such that the average value of the function $f(x) = 2 + 6x - 3x^2$ on the interval $[0, b]$ is equal to 3.

2. (a) (6 points) Evaluate $\int x(x+1)\,e^x\,dx$.

(b) (6 points) Evaluate $\int x\tan^{-1} x\,dx$.

3. (12 points) Evaluate $\int \sin^2 x \cos^4 x \, dx$.

4. (8 points) Evaluate $\displaystyle\int \frac{\sin^3\theta\, d\theta}{\cos^6\theta}$.

5. (8 points) Evaluate $\displaystyle\int \frac{dx}{(4-x^2)^{3/2}}$.

6. (9 points) Evaluate $\int \frac{x^5+2}{x^2-1}\,dx$.

7. (14 points) Evaluate $\int \frac{dx}{x^3+1}$.

8. (12 points) Evaluate $\displaystyle\int \frac{\sin 2x}{1+\cos^4 x}\,dx$.

9. (9 points) Determine whether the integral $\int_1^3 \frac{1}{\sqrt{x-1}}\,dx$ is convergent or divergent.

10. (10 points) Determine whether the improper integral $\displaystyle\int_1^{+\infty} \frac{5-2\sin x}{\sqrt{x^3}}\,dx$ is convergent or divergent.