King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
Math 102- Calculus II
Exam II
2011-2012 (Term 111)

Tuesday, Nov. 22, 2011 **Allowed Time: 2 hours**

Name: _____

ID Number: _____

Section Number: _____ **Serial Number:** _____

Instructions:

1. Write neatly and eligibly. You may lose points for messy work.
2. **Show all your work. No points for answers without justification.**
3. **Calculators and Mobiles are not allowed.**
4. Make sure that you have 9 different problems (6 pages + cover page)

Question #	Grade	Maximum Points
1		7
2		15
3		15
4		10
5		10
6		10
7		8
8		10
9		15
Total		100

(1) **[7 Points]** Find the number c so that $f(c)$ is the average value of the function $f(x) = \sqrt{x}$ over the interval $[0, 2]$.

(2) Using the method of cylindrical shells, set up **(but DO NOT EVALUATE)** an integral for the volume of the solid generated by revolving

a) **[7 Points]** The region enclosed by the curves $y = x^2, y = 0, x = 1$ about the $y-$ axis. [Sketch the region and a typical rectangle]

b) **[8 Points]** The region enclosed by the curves $x = \sin y, x = 0, y = 0, y = \pi$ about the line $y = 4$. [Sketch the region and a typical rectangle]

(3) a) **[7 Points]** Find $\int (2+\tan x)^2 dx$.

b) **[8 Points]** Determine whether the integral $\int_6^8 \frac{4}{(x-6)^3} dx$ converges or diverges. If it converges, find its value.

4) **[10 Points]** Find $\int x^2 \sin(2x) dx$.

5) **[10 Points]** Find $\int_{\frac{-\pi}{2}}^{0} \sqrt{\cos x - \cos^3 x}\, dx$.

6) **[10 Points]** Find $\displaystyle\int \frac{1}{x\sqrt{x^2+4}}\,dx$

7) **[8 Points]** Using the substitution $t = \tan\left(\frac{x}{2}\right)$, find the integral $\int \frac{1}{1-3\cos x} dx$.

8) **[10 Points]** Find $\int (\sin(2x) + 2\cos x) e^{\sin x} dx$.

9) **[15 Points]** Determine whether the integral $\int_2^\infty \frac{x+3}{(x-1)(x^2+1)}dx$ converges or diverges. If it converges, find its value.