Prince Sultan University

Math 113
Major 1
First Semester, Term 111
Sunday, October 30, 2011

Time Allowed: 90 minutes

Student Name:
Student ID #:
Serial Class #:

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may NOT borrow a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be NO talking during the examination.
5. Your exam will be taken immediately if your mobile phone is seen or heard.
6. Looking around or making an attempt to cheat will result in your exam being cancelled.
7. This examination has 10 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2	30	
3,4 5,6	27	
7,8	21	
9,10	22	
Total	100	

1. (21 points) Evaluate the following integrals:

i. $\int \frac{\sqrt{3+\sqrt{x}}}{\sqrt{x}}\,dx$

ii. $\int \frac{\sec(4x)\tan(4x)}{2\sqrt{\sec^3(4x)}}\,dx$

iii. $\int_0^1 x^3\sqrt{x^2+3}\,dx$

2. (9 points) Solve the initial-value problem:

$$\frac{dy}{dx} = \frac{x}{\sqrt{2x+3}}\ ,\quad y(0)=0$$

3. (10 points) Evaluate the integral $\int_{-6}^{4} 2\sqrt{24-2x-x^2}\,dx$ (Note: use an appropriate formula from geometry if necessary).

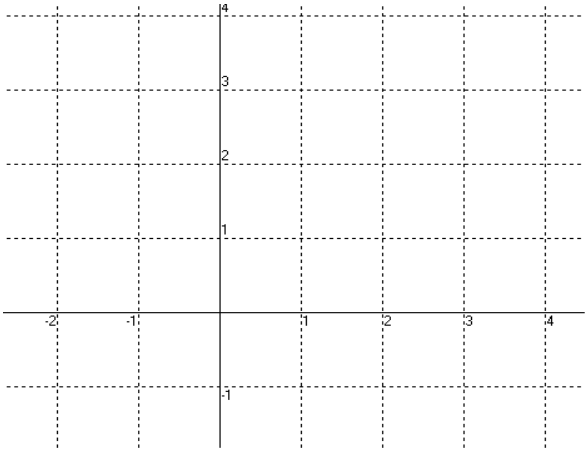
4. (4 points) Use the Fundamental Theorem of Calculus Part 2 to find $F'(x)$ where

$$F(x) = \int_{x^2}^{x^5} \frac{\sin t}{t^2 - 3t + t}\, dt$$

5. (8 points) Evaluate $\sum_{k=10}^{30} (2-k)(k+1)$

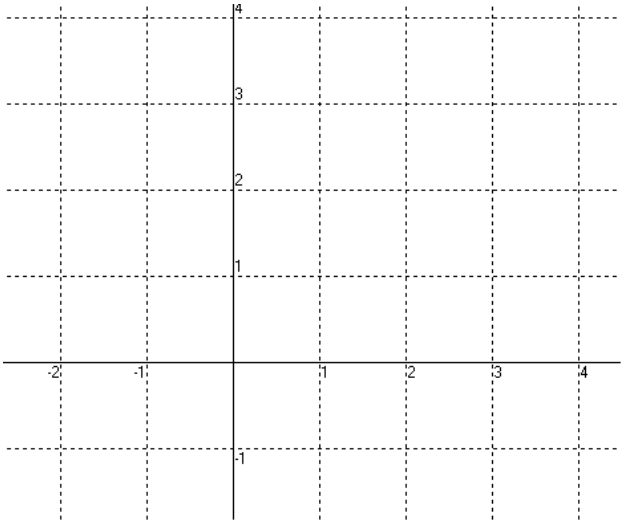
6. (5 points) If $\int_{3}^{6} f(z)dz = 5$, evaluate $\int_{4}^{7} (f(z-1)+6)dz$ by using appropriate substitution

7. (10 points) Find the volume of the solid that results when the region enclosed by $y = \sqrt{x}$, $y = 6 - x$ and $y = 0$ is revolved about the line $y = -2$.



8. (11 points) Find the exact arc length of the curve $y = \dfrac{(x^6 + 8)}{16x^2}$ from $x = 2$ to $x = 3$.

9. (10 points) Find the volume that results when rotating the area contained between the given curves about the given axis of revolution. $y = 4x;\ y = 4x^2$ *around* $y-$*axis.*



10. (12 points) Find the area of the region bounded by the graphs of $f(x) = 3x^3 - x^2 - 10x$ and $g(x) = -x^2 + 2x$