Prince Sultan University

Math 113
Major Exam 1
Second Semester, Term 112
Monday, March 12, 2012

Time Allowed: 90 minutes

Student Name:_____ _____ _____

Student ID #: _____

Serial Class #:_____

Circle Your Section Below:

Section: 223 **Section: 224**

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. Talking during the examination is NOT allowed.
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 11 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2,3	23	
4 5,6	24	
7	24	
8,9	15	
10,11	14	
Total	100	

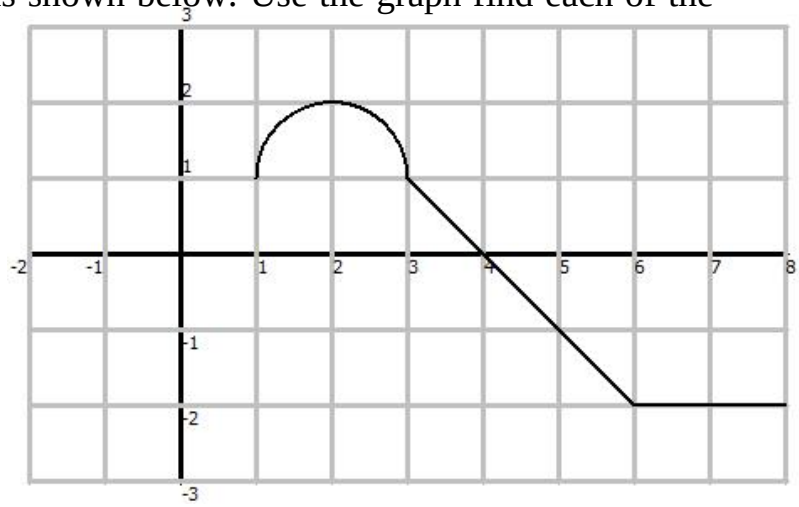
1. (7 points) Find a function $f(x)$ such that the point (1, 2) is on the graph of *f*, the slope of the tangent line at (1, 2) is 3 and $f''(x) = 6x - 2$.

2. (8 points) Evaluate $\sum_{k=32}^{67} (k-3)(k+1)$

3. (8 points) Use a Riemann sum and a limit to compute the exact area under the curve of $y = 2x^2 + 1$ on $[1, 3]$.

4. (8 points) Let $f(x) = 3x^2 - 2x$. Find a value of *c* that satisfies the conclusion of the Integral Mean Value Theorem over the interval $[-1, 1]$.

5. (8 points) Let the graph of $f(x)$ be as shown below. Use the graph find each of the following:



a) $\int_1^3 f(x)dx$

b) $\int_2^6 f(x)dx$

c) $\int_1^8 f(x)dx$

d) The total area between the graph of *f* and the *x*-axis

6. (8 points) Find the derivative of: $F(x) = \int_{x^2}^{x \ln x} \sin(x^2)\, dx$.

7. (24 points) Evaluate the following integrals:

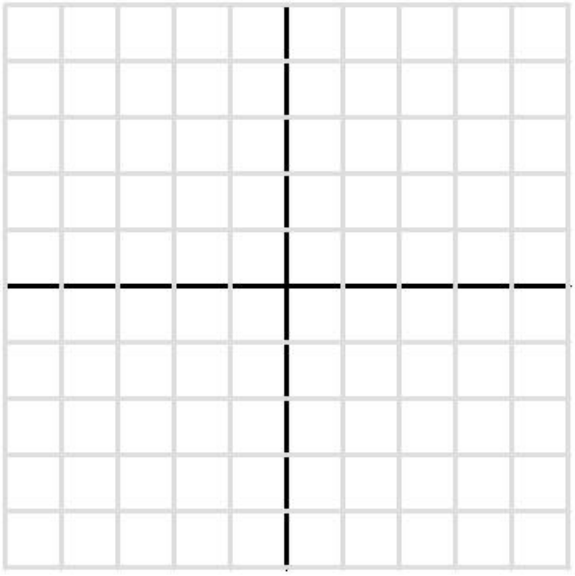
i. $\int \frac{x}{\sqrt{1-x^4}}\,dx$

ii. $\int \frac{x^5}{1+x^2}\,dx$

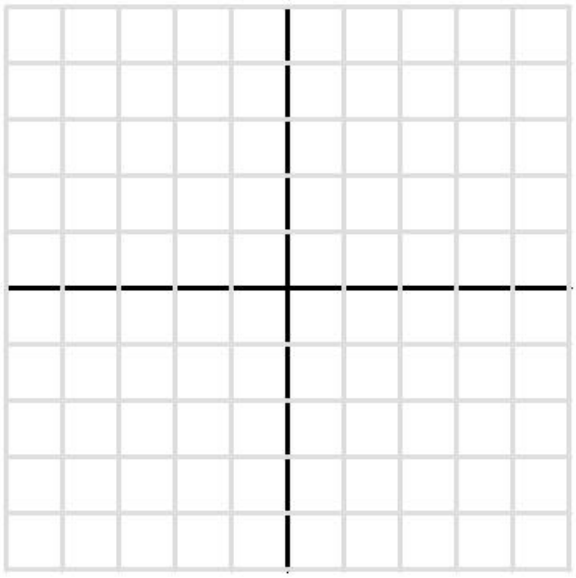
iii. $\int \frac{\csc^2(\sqrt{x})}{\sqrt{x}}\,dx$

iv. $\int_2^4 \frac{dx}{x(\ln x)^2}$

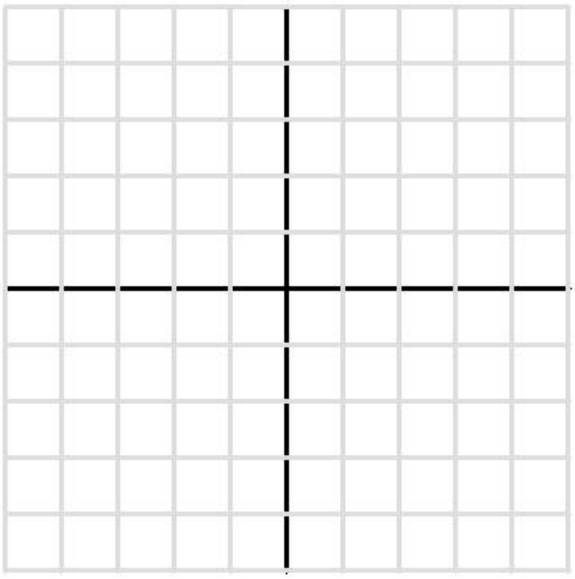
8. (8 points) Sketch the region bounded by the curves below and find its area:
$y = x^2 - 1,\ y = |x|,\ x = -1$ and $x = 1$.



9. (7 point) Sketch the region bounded by the curves below and compute the volume of the solid formed by revolving the region about the *x*-axis: $y = \frac{1}{x},\ x = 1,\ x = 3$.



10.(6 point) Consider the volume resulting from revolving about the line $x = 2$ the region bounded by $y = x^3$, $y = 2$ and the y-axis. Sketch the region and setup only an integral to find the volume.



11.(8 point) Sketch the region and find the volume of the solid that results when the region enclosed by $y = \sqrt{x-2}$, x-axis, y-axis and $y = 3$ is revolved about the line $y = -1$.