Prince Sultan University

Department o f Mathematical Sciences

Major I Exam

Semester II, SPRING 2010 (092)

22nd March, 2010

MATH 113 – CALCULUS II

Time Allowed : 90 minutes $\left(1\frac{1}{2} \text{ hours}\right)$

Maximum Points: 100 points

Mr. Khaled Naseralla

Name of the student: _____

ID number : _____

Section : ____**219**_____

For All The Students:

- Answer all the questions.
- This exam consists of *a total of 6 pages and 10 questions.*
- Show your working in the space provided for each question.
- Show all the key steps of your work.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem
- Scientific, non-programmable calculators are allowed.
- You may NOT borrow a calculator from anyone.
- You may NOT use notes or any textbook.
- There should be NO talking during the examination.
- If your mobile phone is seen or heard, your exam will be taken immediately.

Question	Maximum score	*Your Score*
1 , 2	41	
3 , 4 , 5 , 6	24	
7 , 8	17	
9 , 10	18	
Total	**100**	

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***Q.1 (36 points)*:** Evaluate the following integrals:

a) $\int \frac{(x+1)}{\sqrt[3]{x^2+2x+2}} dx$

b) $\int y\sqrt{9-y^2}\,dy$

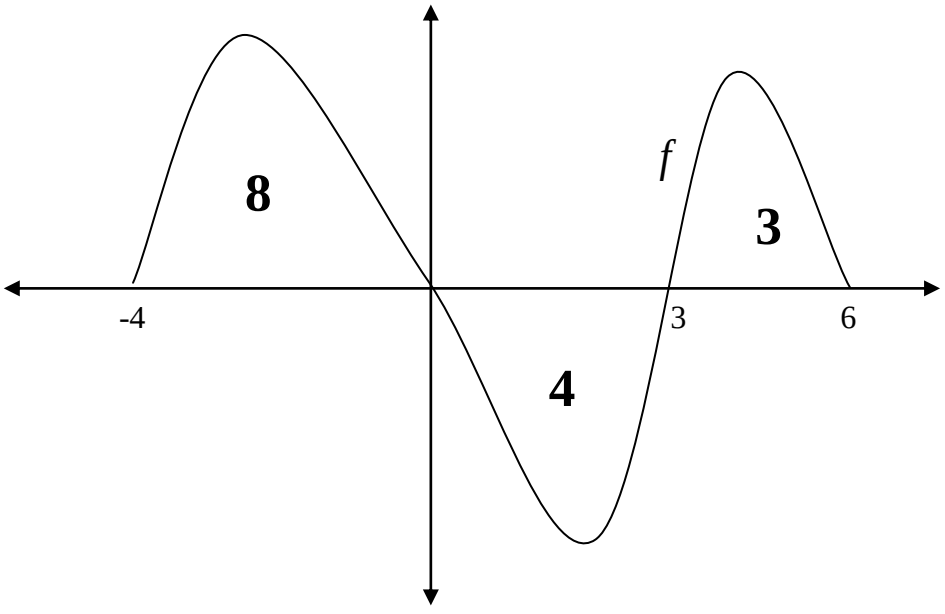
c) $\int_0^4 |x^2-9| dx$

d) $\int \frac{1+\cos^2\theta}{\cos^2\theta} d\theta$

e) $\int_0^1 \frac{x+2}{(\sqrt{x+1}} dx$

f) $\int_1^{\sqrt{2}} \left(\frac{u^5}{2} - \frac{1}{u^3} \right) du$

Q.2 (5 points): In the following graph of the function f , the areas between f and the x-axis are as indicated Use this to find the following integrals:



a) $\int_0^3 f(x)dx$

b) $\int_0^{-4} f(x)dx$

c) $\int_{-4}^6 f(x)dx$

d) $\int_{-4}^6 |f(x)|dx$

e) $\int_3^6 (4 - f(x))dx$

***Q.3 (5 points)*:** Find a function F such that $F(3)=5$ and $F'(x)=2-x^2$

***Q.4 (8 points)*:** Evaluate:

a) $\sum_{i=1}^{40}(i-3)^2$

b) $\sum_{k=15}^{60}(4k+1)$

***Q. 5(6 points)*:** Given $\int_0^2 f(x)dx=4$ and $\int_1^2 f(x)dx=7$, $\int_1^3 f(x)dx=16$

a) Find $\int_0^1 f(x)dx$

b) Find $\int_0^3 f(x)dx$

***Q.6 (5 points)*:** An object fired vertically downward from the top of a building that is $200m$ high. The object reached the ground after 3 seconds. What is its initial velocity?

***Q.7 (7 points)*:** Find the total area of the region between the $x-axis$ and the graph of $y=x^2-3x$ over the interval $[-1,1]$.

Q.8 *(10 points)*: Suppose the acceleration of an object is given by the function $a(t)=-2t+4 \ \ m/s^2$ $v(0)=5$ and $s(0)=4$

a) Find the position function of the particle.

b) Find the velocity of the object at $t=5$

c) Find the total distance traveled between $t=0$ and $t=8$

***Q.9 (12 points)*:** (a) Use the limit of summation to find the area under the curve of $f(x) = 2x + 4$ over the interval $[0,3]$. Use x_k^* as the right-end point of each subinterval.

(b) Verify your answer in part (a) using geometry.

(c) Find the value(s) of x^* that satisfies the Mean-Value Theorem for $f(x) = 2x + 4$ in the interval $[0,3]$

***Q.10 (6 points)*:** Given the initial value problem $\frac{dy}{dx} = kx$, with conditions $y(0) = 10$ and $y(2) = 18$. Find the value of the constant k.