Prince Sultan University

Department of Mathematical Sciences

Major I Exam

Semester II, 2007 Spring (062)

24ᵗʰ March, 2007

MATH 113 – CALCULUS II

Time Allowed : 100 minutes   **Mr. Khaled Naseralla**

Maximum Points: 100 points

Name of the student : _____

ID number   : _____

Section   : _____

For All The Students:

- **Answer all the questions.**

- **This exam consists of *a total of 6 pages and 7 questions.***

- **Show your working in the space provided for each question.**

- **Show all the key steps of your work.**

- **Scientific, non-programmable calculators are allowed.**

Question	Maximum score	*Your Score*
Q.1	25	
Q.2	6	
Q.3	8	
Q.4	5	
Q.5	8	
Q.6	8	
Q.7	8	
Q.8	8	
Q.9	8	
Q.10	8	
Q.11	8	
Total	**100**	

Q.1 :   Evaluate the following integrals: (5 points each)

a) $\displaystyle\int_{4}^{9}\frac{1-3x}{\sqrt{x}}\,dx$

b) $\displaystyle\int_{0}^{\frac{\pi}{2}}\frac{\sin x}{\sqrt{2+\cos x}}\,dx$

c) $\displaystyle\int\frac{3x+6}{\sqrt{2x^{2}+8x+3}}\,dx$

d) $\displaystyle\int\frac{2x(\ln(x^{2}+1))}{x^{2}+1}\,dx$

e) $\int\limits_{-2}^{2} x\sqrt{x+2}\,dx$

Q.2: **Given** $\dfrac{dy}{dx}=\cos x-5x$. **Find** y **given that the point** $(0,1)$ **is on the curve of** y. **(6 points)**

Q.3: **Let** $F(x)=\int\limits_{\pi}^{x}\dfrac{4-\cos t}{6+3\sin t}\,dt$ **Find** **(4 points each)**

  a) $F'(x)$
  b) $F''(2\pi)$

Q.4: **Evaluate:** $\sum\limits_{k=3}^{10}(k^2+1)$ **(5 points)**

Q.5: **a)** Suppose that $F(x)$ is a continuous function and suppose that **(4 points each)**

$F(-2) = 3$, $F(4) = 7$, $F'(-2) = 2$ **and** $F'(4) = -5$.

Find $\displaystyle\int_{-2}^{4} \left[F(x)\right]^2 . F'(x) dx$

b) **Given** $\displaystyle\int_{-2}^{2} f(x)dx = 4$, $\displaystyle\int_{5}^{2} f(x)dx = 10$ **and** $\displaystyle\int_{-2}^{-1} f(x)dx = 3$

Find $\displaystyle\int_{-1}^{5} f(x)dx$

Q.6: Use the Reimann Sum to find the area under the curve $y = 4x + 2$ **(8 points)**

and using x^*_{k} as the right-end point of each subinterval over the interval $[1,3]$.

Q.7: Find the total area between the graph of the function $y = \sin x$ **(8 points)**

and the $x-axis$ over the interval $\left[0, \dfrac{3\pi}{2}\right]$. Sketch the graph of the region

Q.8: A particle moves with a velocity $v(t) = \dfrac{1}{2} - \dfrac{1}{t}$ m/s along an $s-axis$ **(8 points)**

Find the **_distance_** traveled by the particle during the interval $1 \leq t \leq 3$

Q.9: Find the value(s) of x^* that satisfies the Mean-Value Theorem for the function   **(8 points)**
$f(x) = 3x^2$ over the interval $[0, 2]$.

Q.10: A ball is fired vertically upward from ground level with an initial velocity $32ft/s$ **(8 points)**
Determine the maximum height the ball reaches.

$$S = S_\circ + V_\circ t - \frac{1}{2}gt^2$$
$$V = V_\circ - gt$$
$$g = -32\,ft/s^2 \quad \text{or}$$
$$g = -9.8m/s^2$$

Q.11: Consider the function $f(x) = x^2 + 1$. Sketch the region bounded   **(8 points)**
by $f(x)$ and the $x - axis$ over the interval $[-1, 1]$
Estimate the area of that region using *the rectangle method*. (use $n = 4$)