Prince Sultan University

Department of Mathematical Sciences

Fall Term, 2015 (Term 151)
December 26, 2015

MATH 113 – Calculus II
Final Exam

Time Allowed : 120 minutes
Maximum Points: 80 points

Name of the student: _____

ID number : _____

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 6 problems** , some with several parts and a **total of 6 pages**. Make sure your paper has all these problems.

80	**40**

Problem 1:(8 points) Sketch the region enclosed by the curves $y = 12 - x^2 \; and \; y = x^2 - 6$ and find its area.

Problem 2:(8 points) Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the curves $y = x^3,\ y = 8,\ x = 0$ about the x-axis.

Problem 3:(12 points; 4 points each) Evaluate the following integrals.

a) $\int xe^{x^2}\,dx$

b) $\int_0^{\frac{1}{2}} x\cos(\pi x)\,dx$

c) $\int 2x(x+3)^6 dx$

Problem 4:(12 points; 6 points each)

a) Write down the partial fraction decomposition of the function

$$f(x) = \frac{4}{(x^2 - 4)(x + 1)}$$

b) Evaluate the integral $\int f(x)dx$, where $f(x)$ is the function in part (a).

Problem 5:(24 points; 6 points)

Determine whether the following series converges or diverges.

a) $\sum_{n=1}^{\infty} \frac{\ln(n)}{n^2}$

b) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{3n+5}$

c) $\sum_{n=1}^{\infty} \frac{(-2)^n}{n^3}$

d)$\sum_{n=1}^{\infty} \frac{\sin(2n)}{2^n}$

Problem 6:(16 points; 8 points each)

Determine for which x, the following series converges.

a)$\sum_{n=1}^{\infty} \frac{x^n}{3n-4}$

b)$\sum_{n=1}^{\infty} \frac{(4x-7)^n}{n^4}$