PrinceSultanUniversity

Department of Mathematical Sciences

Fall Term, 2015
October 14, 2015

MATH 113

First Major

Time Allowed : 90 minutes

Name of the student:_____

ID number : _____

Instructor's names: **Dr. Wasfi Shatanawi, Dr. Nabil Mlaiki**

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

40	20

Problem1: If $f(x) = x^3 - 3x, 0 \leq x \leq 2$; evaluate the Riemann sum with $n = 6$. Taking simple points to be the right endpoints. What is the Riemann sum represent?

Problem 2: Use the midpoint rule with $n = 4$, to approximate the integral $\int_0^8 sin\sqrt{x}\, dx$.

Problem 3: Use the Fundamental Theorem of Calculus to find the derivative of the function $g(x) = \int_0^x \sqrt{t^2 + 4}$.

Problem 4: Evaluate the following integral

$$a) \int_1^2 \frac{2+3t}{\sqrt{t}}\, dt$$

$$b) \int_0^{\frac{\pi}{4}} \frac{1+cos^2\theta}{cos^2\theta}\, d\theta$$

c) $\int \frac{x^2}{1+x^3}\,dx$

Problem 5: Find the area of the region enclosed by $y = \sqrt{x-1}$ and $x - y = 1$.

Problem 6: Find the volume of the solid obtained by rotating the region bounded by $y = 1 - x^2$ and $y = 0$, about the $x - axis$.

Problem 7: Use the method of cylindrical shells to find the volume generated by rotating the region bounded by $y = x^3, y = 0, and\ x = 1$, about the axis $y = 1$.

Problem 8: Find the average value of the function $f(x) = \sin(4x)$ on the interval $[-\pi, \pi]$.

Problem 9: Evaluate

$$\int x^2 sin2x \, dx$$