Prince Sultan University

Math 211
Major Exam 2
Second Semester, Term 132
Monday, May 12, 2014

Time Allowed: 90 minutes

Student Name:_____   _____   _____

Student ID #: _____

Serial Class #:_____   Section #:   225

Instructor's Name: Dr. Aiman Mukheimer

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	11	
4,5	12	
6,7,8,9,10	22	
11	15	
Total	60	

Q1. (3 points) Find the intervals of increase and decrease for the function $f(x) = \frac{1}{3}x^3 - 9x + 2$

Q2. (4 points) Let $f(x) = \frac{x^2 + 1}{x}$. Find all critical points of f and classify each as a relative maximum, a relative minimum, or neither.

Q3. (4 points) A national consumers' association determines that x years after its founding in 1998. It will have $P(x)$ members, where $P(x) = 100(2x^3 - 45x^2 + 264x)$. What were the largest and smallest membership levels between 2008 and 2013?

Q4. (7 points) Graph $f(x) = \dfrac{3x-1}{x+2}$
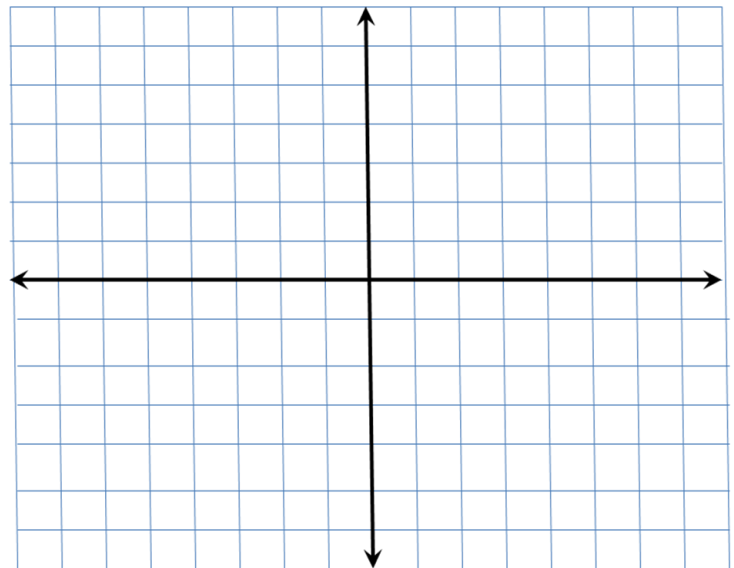
Q5. (5 points) Suppose the demand function is $D(p) = \dfrac{3000}{p} - 100$ and price p for a certain commodity

i. Calculate the elasticity of demand when the price is $p = 10$. Interpret your answer.

ii. Determine whether the demand is elastic, inelastic, or of unit elasticity at $p = 10$

Q6. (3 points) How much money should be invested today at 7 percent **compounded continuously** so that 8 years from now it will be worth $10,000?

Q7. (3 points) Suppose $2,500 is invested at an annual interest rate of 11 percent **compounded monthly**. Compute the balance after 12 years.

Q8. (4 points) Find $\dfrac{dy}{dx}$ where $y = \dfrac{e^{5x}(2x-1)^9}{(x^3+5)^3(4-7x)}$

Q9. (5 points) Determine the area of the region bounded by the curves $y = x^3 - 3x^2$ and $y = x^2 + 5x$

Q10. (7 points) The marginal revenue derived from producing q units of a certain commodity is $R'(q) = 4q - 1.2q^2$ dollars per unit. If revenue derived from producing 20 units is $30000, how much revenue should be expected from producing 40 units?

Q11. (15 points) Evaluate the following integrals:

a) $\int (\dfrac{1}{3y} - \dfrac{5}{\sqrt{y}} + e^{-y/2}) dy$

b) $\int \dfrac{x^2 + 3x - 2}{\sqrt[3]{x}} dx$

c) $\displaystyle\int_{e}^{e^2} \dfrac{1}{x \ln x} dx$

d) $\displaystyle\int_{1}^{4} \dfrac{(\sqrt{x} - 1)^{3/2}}{\sqrt{x}} dx$

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