Math 150 Name:_____
Chapter 5 Review
Ms. Meier

Note ** Integrals can be evaluated with a calculator unless otherwise indicated**

Skip unless otherwise instructed

1) Given the supply and demand functions: $D(x) = (x-9)^2$ and $S(x) = x^2 + 2x + 1$ where x is the units and D(x) and S(x) is the price in dollars, find each.

a) The equilibrium point

b) The consumer's surplus at equilibrium

c) The producer's surplus at equilibrium

d) Graph D(x) and S(x) and indicate all of the above. Use Desmos to graph

2) An economist produced the following Lorenz curves for the distribution of total assets in the U.S. in 1963 and 1983 respectively: $L_1 = x^{10}$ (1963) *and* $L_2 = x^{12}$ (1983). Find the Gini Index for each Lorenz curve and interpret/compare the results.

3) Find the future value of an income stream where $1200 is deposited yearly, for 10 years and earns 6% annual interest compounded continuously.

4) A woman accepts a position as president of a company at age 35. Assuming retirement at age 65 and an annual salary of $92,000 that is paid in a continuous money flow and current interest rates are 5%, what is the president's accumulated future value? Accumulated present value? (Explain this value)

5) Following the birth of their child, a parent wants to make an initial investment that will grow to $150,000 by their child's 20th birthday. Assuming a 10% interest rate, what should the initial investment be? If they decide this is too much, how much would they need to invest yearly to have the same amount?

6) You wish to have a scholarship in your name for $1000 each year to a deserving business student, awarded indefinitely. How much should you donate, at 5.5% interest compounded continuously, to establish your scholarship?

7) A restaurant determined the length of time t, in minutes, that a customer must wait for an order has a probability density function of: $f(t) = 0.02e^{-0.02t}$ *for* $t \geq 0$

a) Find the probability that a customer will wait no more than 20 minutes

b) Find the probability a customer must wait more than 15 minutes for an order

8) Solve the differential equations:

a) $\frac{dy}{dx} = \frac{10x^4}{y}$

b) $\frac{dy}{dx} = 6x^2 + 2$ *and* $y = 8$ *when* $x = 0$

c) Find R(x) given $MR(x) = R'(x) = 8x^3 - 3x^2 + 4x - 5$ and R(x)=146 when x = 3

Answers:

1) a. (4, 25) b) C.S. =$101.33 c) P.S. = $58.67 d) Graph on window [0,10] by [0,100]

2) Gini Index for 1963 = 0.818, Gini Index for 1983 = 0.846. In 1963 the distribution of total assets in the U.S. was more evenly distributed (equitable) than in 1983.

3) F.V.= $16,442.38

4) Future value $6,406,307.89 and present value $1,429,440.51 which is the amount she needs today to invest and thus will accumulate the same future value as her salary.

5) Initial investment should be $20,300.29 or they could make yearly deposits of $2347.76

6) Capital Value (accumulated present value) = $18,181.82

7) a. Probability for wait less than 20 min. is 0.3297
b. Probability for wait more than 15 minutes is 0.7408

8) a. $y = \pm\sqrt{4x^5 + C}$ b. $y = 2x^3 + 2x + 8$
c. $R(x) = 2x^4 - x^3 + 2x^2 - 5x + 8$