

Name:

Student ID:

DAWSON COLLEGE
MATHEMATICS DEPARTMENT

FINAL EXAMINATION

Calculus II Social Science / Commerce 201-203-DW

Instructors: A. Hariton, M. Sohrabi, O. Veres

Date: Thursday, May 19, 2011

Time: 14:00 - 17:00

1. [20 marks] Evaluate the following integrals.

a) $\int x^2 \sqrt{x-1} dx$

b) $\int x^2 \ln(2x) dx$

c) $\int \frac{5x^2 - 2x + 9}{(x-1)(x^2+3)} dx$

d) $\int \cos 4x (\sin 4x + 3)^5 dx$

2. [5 marks] Use the limit definition (Riemann Sums) of the definite integral to evaluate

$$\int_0^3 (2x^2 - 3x + 7) dx.$$

3. [5 marks] The weekly marginal cost function associated with producing a unit is given by the function

$$C'(x) = 0.00003x^2 - 0.002x + 10$$

where $C'(x)$ is measured in dollars/unit, and x denotes the number of units produced. The weekly fixed cost incurred is \$ 542. Find t

4. [10 marks] For a certain commodity the demand equation is $p = -0.1x^2 - x + 104$ and the supply equation is $p = 0.4x^2 + 80$. The price is set at the equilibrium. Find
- Consumers' surplus.
 - Producers' surplus.
5. [5 marks] Use Simpson's Rule with n

$$\sum_{k=1}^n 1 = n$$

$$\sum_{k=1}^n k = \frac{n(n+1)}{2}$$

$$\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\sum_{k=1}^n k^3 = \frac{n^2(n+1)^2}{4}$$

$$CS = \int_0^{\bar{x}} D(x)dx - \bar{p}\bar{x} \quad PS = \bar{p}\bar{x} - \int_0^{\bar{x}} S(x)dx$$

$$\int_a^b f(x)dx = \frac{x}{2}[f(x_0) + 2f(x_1) + 2f(x_2) + \dots + 2f(x_{n-1}) + f(x_n)]$$

where $x = \frac{b-a}{n}$

$$\int_a^b f(x)dx = \frac{x}{3}[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + 2f(x_4) + \dots + 4f(x_{n-1}) + f(x_n)]$$

where $x = \frac{b-a}{n}$ and n is even.

$$P_n(x) = f(a) + f'(a) \cdot (x-a) + \frac{f''(a)}{2!} \cdot (x-a)^2 + \frac{f'''(a)}{3!} \cdot (x-a)^3 + \dots + \frac{f^{(n)}(a)}{n!} \cdot (x-a)^n$$

If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

ANSWERS

1. a) $\frac{2}{7}(x-1)^{\frac{7}{2}} + \frac{4}{5}(x-1)^{\frac{5}{2}} + \frac{2}{3}(x-1)^{\frac{3}{2}} + C$ b) $\frac{1}{3}x^3 \ln(2x) - \frac{1}{9}x^3 + C$
c) $3 \ln|x-1| + \ln(x^2+3) + C$ d) $\frac{1}{24}(\sin 4x + 3)^6 + C$
2. $\frac{51}{2}$
3. $C(300) = 3722$
4. $\bar{x} = 6, \bar{p} = 94.4, CS = 32.4, PS = 57.6$
5. **14.7772**
6. $\frac{125}{6}$
7. **-1**
8. $-2e^2$
10. $\frac{1}{3}y^3 - y^2 = -\frac{1}{x+1} - \frac{1}{6}$
11. $4 + 6(x-1) + \frac{3}{2}(x-1)^2 + 2(x-1)^3 - \frac{3}{4}(x-1)^4$
12. $\frac{109}{18}$
13. $-\frac{4}{75}$
14. a) convergent by the Integral Test b) convergent by the Comparison Test
c) divergent by the Test for Divergence.