

MATH 172 PROBLEM SET 3

1. Find the following integrals:

a. $\int \frac{x+1}{e^x} dx$

c. $\int (x - e^{-x})^2 dx$

e. $\int \frac{\ln(x+1)}{\sqrt{x+1}} dx$

b. $\int \sqrt[3]{x} \ln(x^5) dx$

d. $\int 2(2x-1)\ln(x-1) dx$

f. $\int (\ln x)^3 dx$

2. Find the following integrals:

a. $\int \frac{14x^3 + 24x}{(x^2 + 1)(x^2 + 2)} dx$

c. $\int \frac{5x^4 + 9x^2 + 3}{x(x^2 + 1)^2} dx$

b. $\int \frac{2x^2 - 5x - 2}{(x-2)^2(x-1)} dx$

d. $\int \frac{5x^2 + 2}{x^3 + x} dx$

3. Find the area of the region bounded by the x-axis and the curve $y = x^2 e^x$ between $x=0$ and $x=1$.

4. If the cost function is given by $c = 4000 + 10q + 0.1q^2$, find the average cost on the interval from $q=100$ to $q=500$.

5. Find the average value of $f(t) = t^2 e^{-t}$ over the interval $[0, 1]$.

6. If the demand function is given by $p = \frac{200(q+3)}{q^2 + 7q + 6}$, find consumers' surplus assuming market equilibrium point is $(10, \frac{325}{22})$.

7. If the supply function is given by $p = 10(q+10)e^{(0.1q+1)}$, find producers' surplus assuming market equilibrium point is $q = 20$.

8. Determine the following integrals

a) $\int 2^{3q+4} dq$

c) $\int_5^{11} \frac{e^{\ln x}}{x} dx$

e) $\int \frac{x e^x}{(x+1)^2} dx$

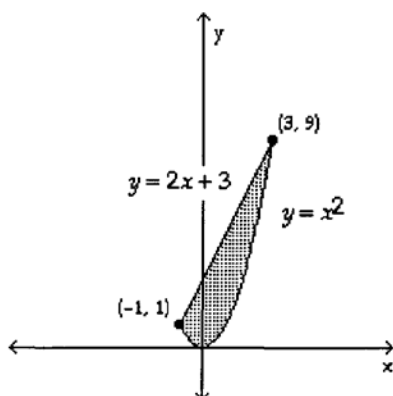
b) $\int \frac{\ln(xe^{2x})}{x} dx$

d) $\int \ln(4x) dx$

f) $\int x^3 e^{x^2} dx$

9. Express the area of the shaded region in terms of an integral (or integrals) and evaluate.

a)



b)

