***Noble onyebuchi offor***

***19/eng03/019***

***Civil engineering***

***No 188***

 ***Mat 104***

1. Find dy/dx if y= (2 cos 3x) / x3

2. If y= xe2x , show that the differential equation d2y/dx2- 4dy/dx + 4y = 0.

3. Write your name, matric number and department.

4. Find the integral of ex sin 2x with respect to x.

 Solutions;

1. U = cos3x V = x3

du = -3sin3x dv = 3x2

 **using formula dy/dx(u/v) = vdu/dx – udv/dx**

 **v2**

where u And v are functions of x;

dy/dx = x3(-3sin3x) – (cos3x)3x2

 (x3)2

 **Recall that cos3x was originally 2cos3x hence we have;**

2[x3(-3sin3x) – (cos3x)3x2/x6]

2[-3x3sin3x/x6 – 3x2cos3x/x6]

-6 [-sin3x/x3 + cos3x/x4]

1. Dy/dx of xe2x = 2xe2x

D2y/dx2 of xe2x = 4xe2x

**Inserting these values into the equation gives;**

 4xe2x - 4(2xe2x) + 4(xe2x) = 0

**xe2x is common in all so we factor it out**

xe2x(4 – 4(2) + 4) = 0

xe2x(4 – 8 + 4) = 0

xe2x (-8) = 0

**recall that y is** **xe2x hence the value of x in the equation is -8**

answer = -8e-16

1. ∫e2sin2xdx

U = e2 dv = sin2x

du = 2e2dx v = -2cos2x

**using the formula ∫udv = uv - ∫vdu**

e2 – 2cos2x -∫– 2cos2x(2e2dx)

e2 – 2cos2x + 2∫cos2x2e2dx

**second integration**

u = 2e2 dv = cos2x

du = 4e2dx v = 2sin2x

**also using the formula ∫udv = uv - ∫vdu**

2e22sin2x -∫2sin2x4e2dx

2e22sin2x-4e2∫2sin2xdx

2e22sin2x-4e2(-2cos2x) + C

2e2(2sin2x) + 4e2(2cos2x) + C

The final answer = e2(2cos2x) + 2e2(2sin2x) + 4e2(2cos2x) + C.