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| MATRIC | 19/ENG09/021 |
| DEPARTMENT | AEROSPACE ENGINEERING |
| COURSE CODE | ENG 282 |
| COURSE TITLE | ENGINEERING MATHEMATICS 2 |
| TOPIC | L.M.S. ASSIGNMENT 2 SOLUTION |
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1. dy/dx + ytanhx = 2sinhx

I.F. = exp(Pdx), where P = tanhx

Pdx = =

Let u = coshx

du = sinhx dx

= du = lnu = ln(coshx)

I.F. = exp(ln(coshx)) = coshx

yI.F. =

ycoshx = dx = sinh2x + C

y = (sinh2x + C)/coshx

2. dy/dx + 2y = e3x

I.F. = exp(Pdx), where P = 2

I.F. = e2x

yI.F. = Q I.F. dx

ye2x = e5x dx

ye2x = e5x /5 + C

y = (e3x/5) + (C/e2x)

3. x dy/dx = x2 + 2x – 3

dy = (x + 2 – 3x-1)dx

dy = x + 2 – 3x-1 dx

y = (x2/2) + 2x – 3lnx + C

4. dy/dx + y/x = y3

y-3dy/dx + y-2/x = 1

z = y1 - 3 = y-2

dz/dx = -2y-3 dy/dx

-2y-3 dy/dx – 2y-2/x = -2

dz/dx – 2z/x = -2

I.F. = exp(Pdx), where P = -2/x

I.F. = exp(lnx-2) = x-2

zI.F. = Q I.F. dx

zx-2 = -2x-2 dx = 2x-1 + C

z = 2x + Cx2

y-2 = 2x + Cx2

1/y2 = 2x + Cx2

y2 = 1/(2x + Cx2)

y = 1/(2x + Cx2)0.5

5. x2 dy/dx = x3sin3x + 4

dy = xsin3x +4x-2 dx

dy = xsin3x +4x-2 dx

y = (xsin3x dx – 1sin3x dx) - 4x-1 + C

y = -x(cos3x)/3 + (cos3x/3) dx - 4x-1 + C

y = (-xcos3x/3 )+ (sin3x/9) - 4x-1 + C

6. (x3 + xy2) dy/dx = 2y3

dy/dx = 2y3/(x3 + xy2)

y = vx

dy/dx = v + x dv/dx

v + x dv/dx = 2v3x3 / x3(1 + v2)

v + x dv/dx = 2v3/(1 + v2)

x dv/dx = (2v3 – v – v3)/(1 + v2) = (v3- v)/(1 + v2)

((1+v2)/(v3-v))dv = (1/x)dx

((1+v2)/(v3-v))dv = (1/x)dx

((1+v2)/(v3-v))dv = (1/v3-v)dxv+ (v/v2-1)dv = (1/x)dx = lnx + C

(1/v3-v)dv+ ln(v2-1)/2 = lnx + C

For (1/v3-v)dv :

(1/v3-v)dv = (1/v(v2-1))dv = (1/(v)(v-1)(v+1))dv = A/v + B/(v+1) + C/(v-1) dv

1/(v)(v-1)(v+1) = A/v + B/(v+1) + C/(v-1)

1 = A(v2-1) + B(v2-v) + C(v2+v)

Let v = 1

1 = 2C, C = ½

Let v = -1

1 = 2B, B = ½

Let v = 0

1 = -A, A = -1

1/(v)(v-1)(v+1) = - 1/v + 1/2(v+1) + 1/2(v-1)

( 1/(v)(v-1)(v+1) )dv = ( - 1/v + 1/2(v+1) + 1/2(v-1) )dv

( - 1/v + 1/2(v+1) + 1/2(v-1) )dv = -lnv + ln(v+1)/2 + ln(v-1)/2

-lnv + ln(v+1)/2 + ln(v-1)/2 + ln(v2-1)/2 = lnx + C

y = vx, v = y/x

-ln(y/x) + ln( (y/x)+1 )/2 + ln( (y/x)-1 )/2 + ln( (y2/x2)-1 )/2 = lnx + C