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BSC (HONS)

COMPUTER SCIENCE |

LAB TEST | 20211455

QUES 1 :

SOL : $y''' - 3y'' + 4y' - 2y = 0$

```
sol = DSolve[y'''[x] - 3 y''[x] + 4 y'[x] - 2 y[x] == 0, y[x], x]
```

$$\{\{y[x] \to e^x C[3] + e^x C[2] \cos[x] + e^x C[1] \sin[x]\}\}$$

```
sol1 = y[x] /. sol[[1]] /. {C[1] → -1, C[2] → -1, C[3] → -1}
```

$$-e^x - e^x \cos[x] - e^x \sin[x]$$

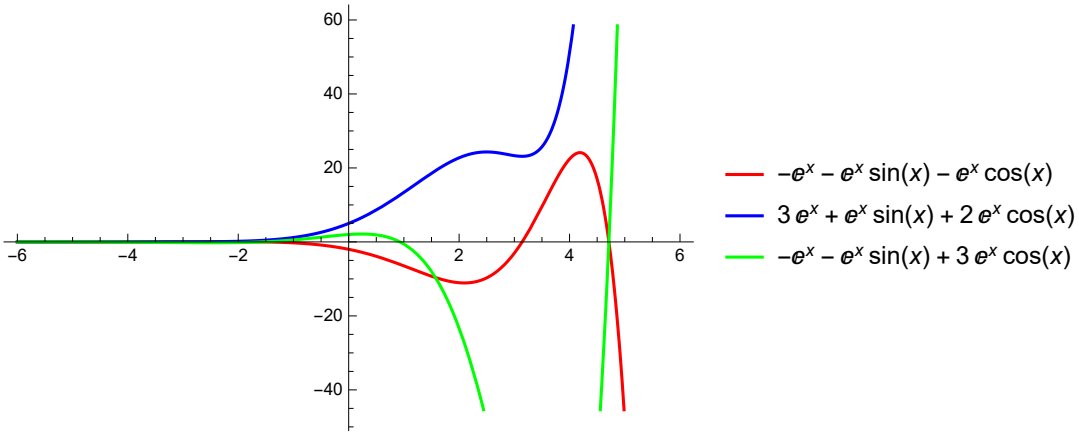
```
sol2 = y[x] /. sol[[1]] /. {C[1] → 1, C[2] → 2, C[3] → 3}
```

$$3 e^x + 2 e^x \cos[x] + e^x \sin[x]$$

```
sol3 = y[x] /. sol[[1]] /. {C[1] → -1, C[2] → 3, C[3] → -1}
```

$$-e^x + 3 e^x \cos[x] - e^x \sin[x]$$

```
Plot[{sol1, sol2, sol3}, {x, -6, 6},
 PlotStyle → {{Red}, {Blue}, {Green}}, PlotLegends → {sol1, sol2, sol3}]
```



QUES 2 :

SOL : y'' – 2 y' = e^xSinx by VOP

```
Eqn := y''[x] - 2 * y'[x]
f[x_] = e^x * Sin[x]
P = DSolve[Eqn == 0, y[x], x]
```

$e^x \text{Sin}[x]$

$$\left\{\left\{y[x] \to \frac{1}{2} e^{2x} C[1] + C[2]\right\}\right\}$$

```
u[x_] := 1/2 e^(2 x)
v[x_] := 1
```

```
w = Simplify[Det[{{u[x], v[x]}, {u'[x], v'[x]}}]]
```

$-e^{2x}$

```
g[x_] := -(v[x] * f[x]) / w
h[x_] := (u[x] * f[x]) / w
```

```
G = Simplify[Integrate[g[x], x]]
```

$$\frac{e^x e^{-2x} \left(-\text{Cos}[x] + \left(-2 + \text{Log}[e]\right) \text{Sin}[x]\right)}{5 - 4\,\text{Log}[e] + \text{Log}[e]^2}$$

```
H = Simplify[Integrate[h[x], x]]
```

$$\frac{e^x \left(\text{Cos}[x] - \text{Log}[e]\,\text{Sin}[x]\right)}{2\left(1 + \text{Log}[e]^2\right)}$$

```
PI = u[x] G + v[x] H
```

$$\frac{e^x \left(-\text{Cos}[x] + \left(-2 + \text{Log}[e]\right) \text{Sin}[x]\right)}{2\left(5 - 4\,\text{Log}[e] + \text{Log}[e]^2\right)} + \frac{e^x \left(\text{Cos}[x] - \text{Log}[e]\,\text{Sin}[x]\right)}{2\left(1 + \text{Log}[e]^2\right)}$$