Mehul Pant | BSC(Hons)CS | 20211473 | Practical- 5

Problem -1 :

x'[t] + y'[t] - x[t] = -2*t

x'[t] + y'[t] - 3x[t] - y[t] = t*t

SOL :

In[200]:=

```
sol1 =
 DSolve[{x '[t] + y '[t] - x[t]== - 2 * t, x '[t] + y '[t] - 3 * x[t] - y[t]== t * t}, {x, y}, t]
particularsol = {x[t], y[t]} /. sol1 [[1]] / . {C[1]→ 5}
Plot[Evaluate [particularsol ], {t, - 10, 10}]
```

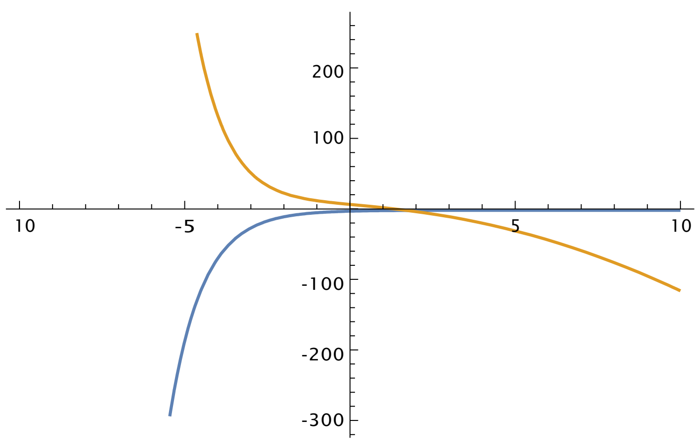
Out[200]=

$$\left\{\left\{x \to \text{Function}\left[\{t\}, -2\,t - t^2 + \frac{1}{4}\left(4\left(-2 + 2\,t + t^2\right) - e^{-t}\,c_1\right)\right],\ y \to \text{Function}\left[\{t\}, 2\,t + t^2 + \frac{1}{2}\left(-4\left(-2 + 2\,t + t^2\right) + e^{-t}\,c_1\right)\right]\right\}\right\}$$

Out[201]=

$$\left\{-2\,t - t^2 + \frac{1}{4}\left(-5\,e^{-t} + 4\left(-2 + 2\,t + t^2\right)\right),\ 2\,t + t^2 + \frac{1}{2}\left(5\,e^{-t} - 4\left(-2 + 2\,t + t^2\right)\right)\right\}$$

Out[202]=



Problem -2 :
x'[t] + y'[t] - 2*x[t]-4*y[t] =Exp[t]
x'[t] + y'[t] - y[t] =Exp[4*t]
SOL :

In[203]:=
```
sol1 = DSolve[{x '[t] + y '[t] - 2 * x[t] - 4 * y[t]== Exp[t],
    x '[t] + y '[t] - y[t]== Exp[4 * t]}, {x, y}, t]
particularsol = {x[t], y[t]} /. sol1 [[1]] / . {C[1]→ 2}
Plot[Evaluate [particularsol ], {t, - 10, 10}]
```

Out[203]=

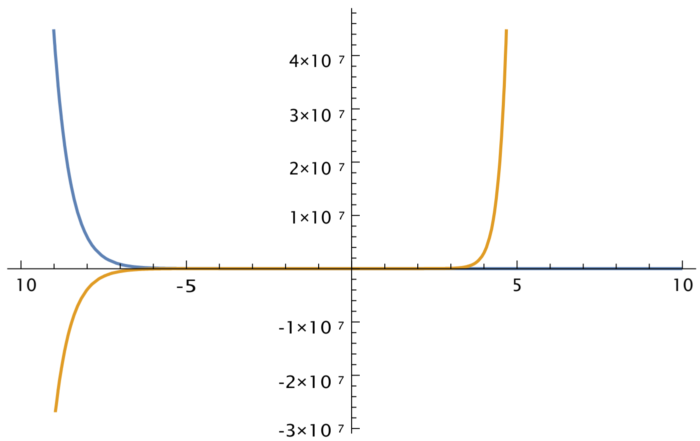
$$\left\{\left\{x \to \text{Function}\left[\{t\}, -e^{t}\left(-1+e^{3t}\right)+\frac{1}{3}\left(3\,e^{t}\left(-1+e^{3t}\right)+e^{-2t}\,C[1]\right)\right],\right.\right.$$

$$\left.\left.y \to \text{Function}\left[\{t\}, e^{t}\left(-1+e^{3t}\right)-\frac{2}{9}\left(3\,e^{t}\left(-1+e^{3t}\right)+e^{-2t}\,C[1]\right)\right]\right\}\right\}$$

Out[204]=

$$\left\{-e^{t}\left(-1+e^{3t}\right)+\frac{1}{3}\left(2\,e^{-2t}+3\,e^{t}\left(-1+e^{3t}\right)\right),\ e^{t}\left(-1+e^{3t}\right)-\frac{2}{9}\left(2\,e^{-2t}+3\,e^{t}\left(-1+e^{3t}\right)\right)\right\}$$

Out[205]=



Problem -3 :

x'[t] + y'[t] +4* y[t] = Sin[t]

x'[t] + y'[t] - x[t] - y[t] = 0

SOL :

In[206]:=
```
sol1 =
 DSolve[{x '[t] + y '[t] + 4 * y[t]== Sin[t], x '[t] + y '[t] - x[t] - y[t]== 0}, {x, y}, t]
particularsol = {x[t], y[t]} /. sol1[[1]] /. {C[1]→ 1}
Plot[Evaluate [particularsol ], {t, - 10, 4}]
```

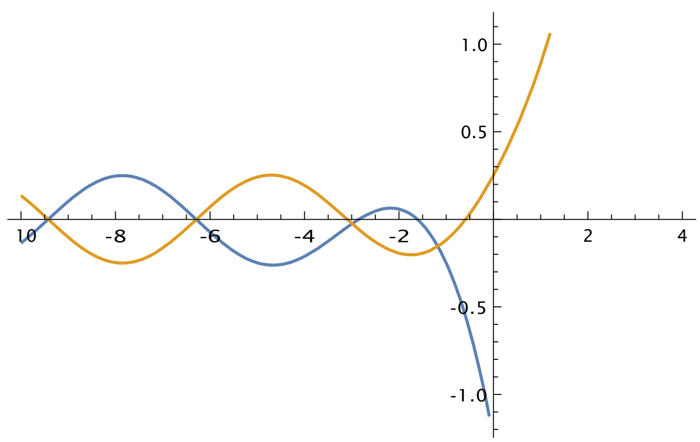
Out[206]=

$$\left\{\left\{x \to \text{Function}\left[\{t\}, \frac{5\, e^{t}\, C[1]}{4} - \frac{\text{Sin}[t]}{4}\right], y \to \text{Function}\left[\{t\}, -\frac{e^{t}\, C[1]}{4} + \frac{\text{Sin}[t]}{4}\right]\right\}\right\}$$

Out[207]=

$$\left\{-\frac{5\, e^{t}}{4} - \frac{\text{Sin}[t]}{4}, \frac{e^{t}}{4} + \frac{\text{Sin}[t]}{4}\right\}$$

Out[208]=



Problem -4 :

2*x'[t] +4* y'[t] +x[t]- y[t] =3*Exp[t]

x'[t] + y'[t] + 2*x[t] +2* y[t] = Exp[t]

SOL:

In[209]:=
```
sol1 = DSolve[{ 2 * x '[t] + 4 * y '[t] + x[t] - y[t]==   3 * Exp[t],
x '[t] + y '[t] + 2 * x[t] + 2 * y[t]==   Exp[t]}, {x, y}, t]
particularsol = {x[t], y[t]} /. sol1[[1]]/ . {C[1]→    1, C[2]→   2}
Plot[Evaluate[particularsol], {t, - 5, 5}]
```

Out[209]=

$$\Big\{\Big\{x \to \text{Function}\Big[\{t\}, -\frac{1}{2} e^{-2t}\left(-3+e^{3t}\right)\left(\frac{e^{3t}}{2}-t\right) - \frac{3}{2} e^{-2t}\left(-1+e^{3t}\right)\left(-\frac{e^{3t}}{6}+t\right) - \frac{1}{2} e^{-2t}\left(-3+e^{3t}\right){}_1 - \frac{3}{2} e^{-2t}\left(-1+e^{3t}\right){}_2\Big],$$

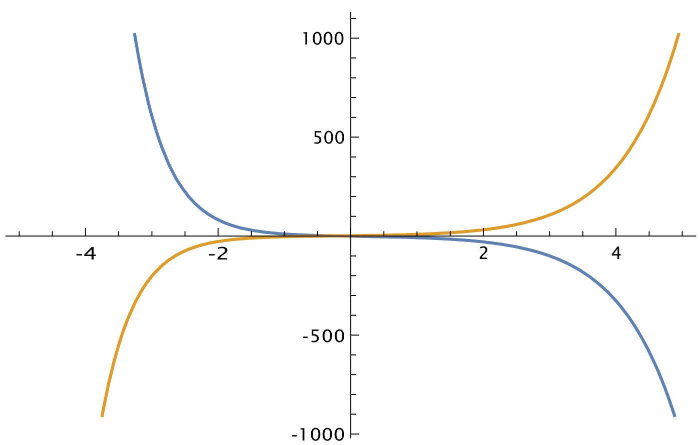
$$y \to \text{Function}\Big[\{t\}, \frac{1}{2} e^{-2t}\left(-1+e^{3t}\right)\left(\frac{e^{3t}}{2}-t\right) + \frac{1}{2} e^{-2t}\left(-1+3e^{3t}\right)\left(-\frac{e^{3t}}{6}+t\right) + \frac{1}{2} e^{-2t}\left(-1+e^{3t}\right){}_1 + \frac{1}{2} e^{-2t}\left(-1+3e^{3t}\right){}_2\Big]\Big\}\Big\}$$

Out[210]=

$$\Big\{\frac{1}{2} e^{-2t}\left(-3+e^{3t}\right) - 3 e^{-2t}\left(-1+e^{3t}\right) - \frac{1}{2} e^{-2t}\left(-3+e^{3t}\right)\left(\frac{e^{3t}}{2}-t\right) - \frac{3}{2} e^{-2t}\left(-1+e^{3t}\right)\left(-\frac{e^{3t}}{6}+t\right),$$

$$-\frac{1}{2} e^{-2t}\left(-1+e^{3t}\right) + e^{-2t}\left(-1+3e^{3t}\right) + \frac{1}{2} e^{-2t}\left(-1+e^{3t}\right)\left(\frac{e^{3t}}{2}-t\right) + \frac{1}{2} e^{-2t}\left(-1+3e^{3t}\right)\left(-\frac{e^{3t}}{6}+t\right)\Big\}$$

Out[211]=



Problem -5 :

x''[t] + y'[t] =Exp[2*t]

x'[t] + y'[t] - x[t] - y[t] = 0

SOL:

In[212]:=

```
sol1 = DSolve[{x ''[t] + y '[t]== Exp[2 * t], x '[t] + y '[t] - x[t] - y[t]== 0}, {x, y}, t]
particularsol = {x[t], y[t]} /. sol1[[1]]/ . {C[1]→ 1, C[2]→ 2, C[3]→ 2}
Plot[Evaluate[particularsol], {t, - 20, 10}]
```

Out[212]=

```
{{x → Function[{t}, ℯ^t (-1 + ℯ^t) + 1/2 ℯ^(2 t) (-2 + ℯ^t) (- 1 + t) + 1/2 ℯ^t (-2 + ℯ^t) (-1 + ℯ^t - ℯ^t t) -
    ℯ^t (-1 + t) C[1] + (- 1 + ℯ^t) C[2] + (- 1 + ℯ^t - ℯ^t t) C[3]], y → Function[{t},
   ℯ^t (1 - ℯ^t) - 1/2 ℯ^(2 t) (-2 + ℯ^t) t + 1/2 ℯ^t (- 2 + ℯ^t) (1 + ℯ^t t) + ℯ^t t C[1] + (1 - ℯ^t) C[2] + (1 + ℯ^t t) C[3]]}}
```

Out[213]=

```
{2 (-1 + ℯ^t) + ℯ^t (-1 + ℯ^t) + ℯ^t (-1 + t) +
  1/2 ℯ^(2 t) (-2 + ℯ^t) (- 1 + t) + 2 (-1 + ℯ^t - ℯ^t t) + 1/2 ℯ^t (-2 + ℯ^t) (-1 + ℯ^t - ℯ^t t), 1
 2 (1 - ℯ^t) + ℯ^t (1 - ℯ^t) - ℯ^t t - 1/2 ℯ^(2 t) (-2 + ℯ^t) t + 2 (1 + ℯ^t t) + _/2 ℯ^t (-2 + ℯ^t) (1 + ℯ^t t)}
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Out[214]=