Do the following tasks using Mathematica.

(a) Solve the differential equation:

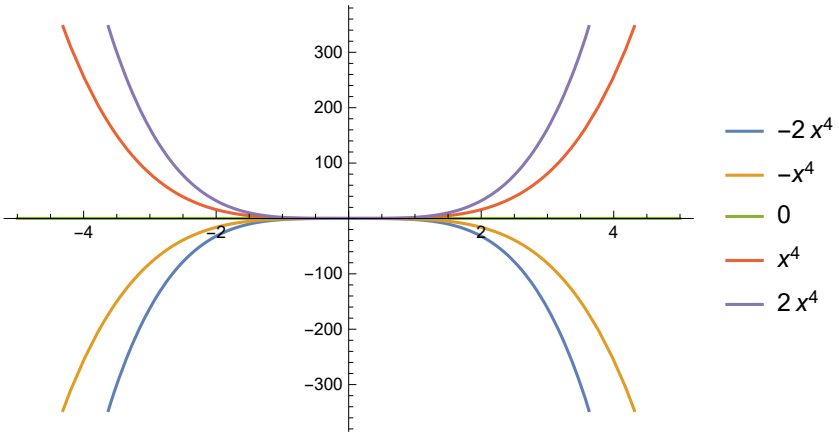
xy' = 4y

Plot multiple solutions of the differential equation with values of constants c=-2,-1,0,1,2 in a single graph

In[1]:=
```
DSolve[x y'[x] == 4 y[x], y[x], x]
```
Out[1]=
$$\{\{y[x] \to x^4\, C[1]\}\}$$

In[2]:=
```
sol = y[x] /. %1 /. C[1] → a
```
Out[2]=
$$\{a\, x^4\}$$

In[3]:=
```
Plot[Evaluate[Table[sol, {a, -2, 2}]], {x, -5, 5}, PlotLegends → "Expressions"]
```
Out[3]=



(b)

y'' – 10y' + 25y = 0 ; y(0) = 1 , y'(1) = 0 Find the value of y(2)

In[4]:=
```
DSolve[{y''[t] - 10 y'[t] + 25 y[t] == 0, y[0] == 1, y'[1] == 0}, y[t], t]
```
Out[4]=
$$\left\{\left\{y[t] \to -\frac{1}{6}\, e^{5t}\,(-6+5t)\right\}\right\}$$

In[5]:=
```
y[t] /. %4 /. t → 2 // N
```
Out[5]=
$$\{-14\,684.3\}$$

In[6]:=
```
ClearAll["Global`*"]
```

(c) Plot the numerical solution of the differential equation for $0 \le t \le 50$:

$x'' + 0.15x' - x + x^3 = 0.3 \cos t, x(0) = -1, x'(0) = 1$

In[7]:=
```
NDSolve[{x''[t] + 0.15 x'[t] - x[t] + x[t]^3 == 0.3 Cos[t], x[0] == -1, x'[0] == 1},
 x[t], {t, 0, 50}]
```

Out[7]=
```
{{x[t] → InterpolatingFunction[ ⊞ Domain: {{0., 50.}}
                                Output: scalar ][t]}}
```

In[8]:=
```
Plot[x[t] /. %7, {t, 0, 50}, PlotRange → Full]
```

Out[8]=