In[50]:= **Question 1**

Out[50]=

Question

Out[49]=

Question

Out[48]=

Question

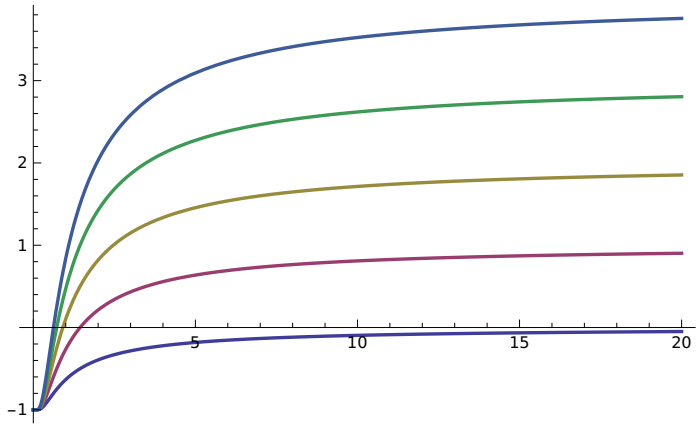
```
sol = DSolve[x ^ 2 * y '[x] == 1 + y[x], y[x], x]
```

$$\left\{\left\{y[x] \to -1 + e^{-1/x}\, C[1]\right\}\right\}$$

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{-1 + e^{-1/x},\ -1 + 2\, e^{-1/x},\ -1 + 3\, e^{-1/x},\ -1 + 4\, e^{-1/x},\ -1 + 5\, e^{-1/x}\right\}$$

```
Plot[Evaluate[tab], {x, 0, 20}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```



In[51]:= **Question 2**

Out[51]=

2 Question

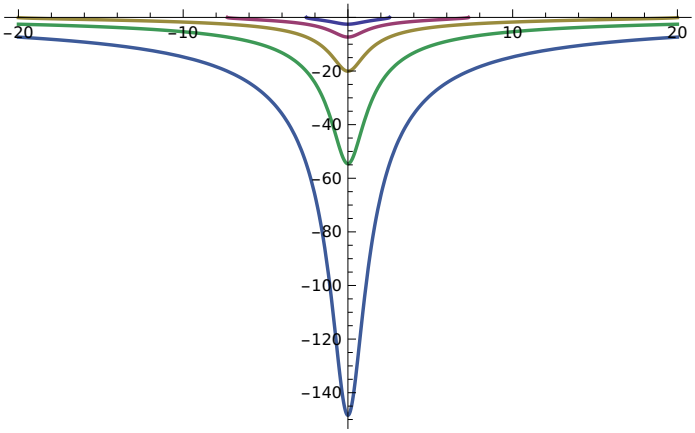
```
sol = DSolve[y '[x] (y[x] * x ^ 2 + y[x]) == -(x * y[x] ^ 2 + x), y[x], x]
```

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

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{-\frac{\sqrt{-1 + e^2 - x^2}}{\sqrt{1 + x^2}}, -\frac{\sqrt{-1 + e^4 - x^2}}{\sqrt{1 + x^2}}, -\frac{\sqrt{-1 + e^6 - x^2}}{\sqrt{1 + x^2}}, -\frac{\sqrt{-1 + e^8 - x^2}}{\sqrt{1 + x^2}}, -\frac{\sqrt{-1 + e^{10} - x^2}}{\sqrt{1 + x^2}}\right\}$$

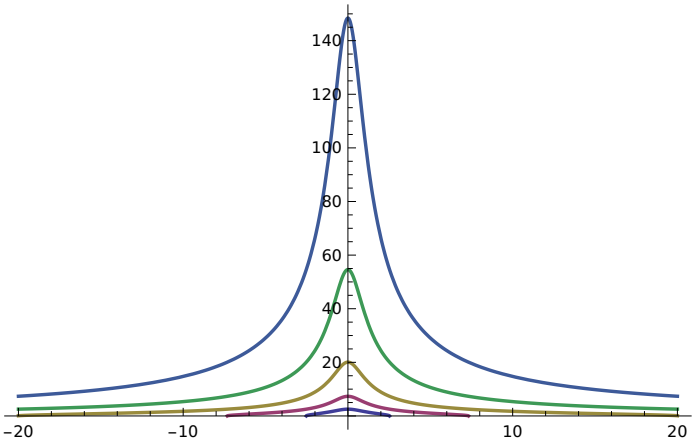
```
Plot[Evaluate[tab], {x, -20, 20}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```




```
tab = Table[y[x] /. sol[[2]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{\frac{\sqrt{-1+e^2-x^2}}{\sqrt{1+x^2}}, \frac{\sqrt{-1+e^4-x^2}}{\sqrt{1+x^2}}, \frac{\sqrt{-1+e^6-x^2}}{\sqrt{1+x^2}}, \frac{\sqrt{-1+e^8-x^2}}{\sqrt{1+x^2}}, \frac{\sqrt{-1+e^{10}-x^2}}{\sqrt{1+x^2}}\right\}$$

```
Plot[Evaluate[tab], {x, -20, 20}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```



In[52]:=
```
Question 3
```

Out[52]=

3 Question

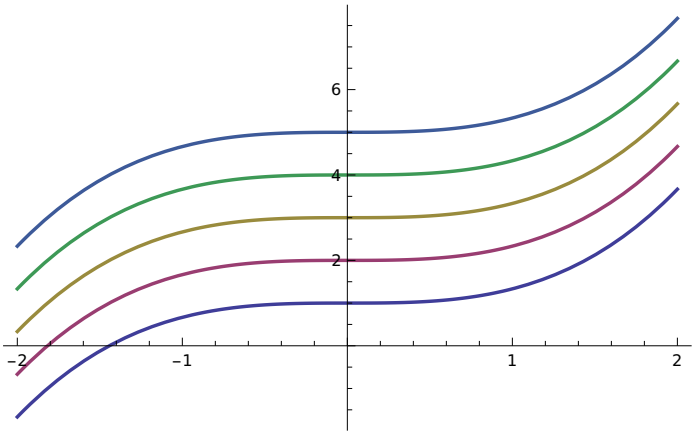
```
sol = DSolve[y'[x] - x^2 == 0, y[x], x]
```

$$\left\{\left\{y[x] \to \frac{x^3}{3} + C[1]\right\}\right\}$$

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{1+\frac{x^3}{3}, 2+\frac{x^3}{3}, 3+\frac{x^3}{3}, 4+\frac{x^3}{3}, 5+\frac{x^3}{3}\right\}$$

```
Plot[Evaluate[tab], {x, -2, 2}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```



In[53]:= **Question 4**

Out[53]=

4 Question

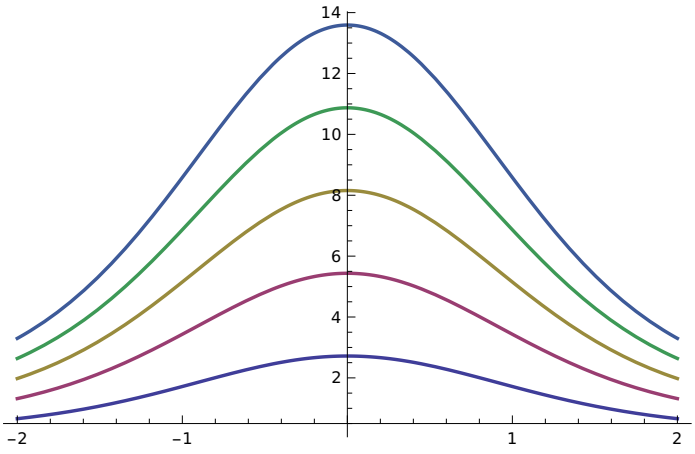
```
sol = DSolve[y '[x] + Sin[x] * y[x] == 0, y[x], x]
```

$\{\{y[x] \to e^{\text{Cos}[x]}\, C[1]\}\}$

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$\{e^{\text{Cos}[x]},\ 2\, e^{\text{Cos}[x]},\ 3\, e^{\text{Cos}[x]},\ 4\, e^{\text{Cos}[x]},\ 5\, e^{\text{Cos}[x]}\}$

```
Plot[Evaluate[tab], {x, -2, 2}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```



In[54]:= **Question 5**

Out[54]=

5 Question

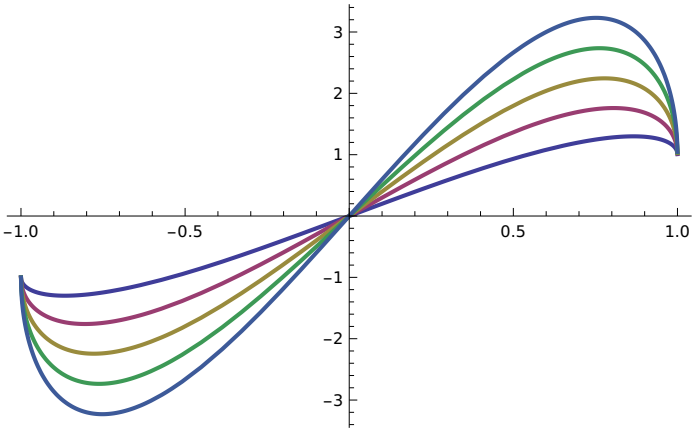
```
sol = DSolve[x * (1 - x ^ 2) * y '[x] + (2 * x ^ 2 - 1) * y[x] - x ^ 3 == 0 , y[x], x]
```

$\left\{\left\{y[x] \to x + x\, \sqrt{1 - x^2}\ C[1]\right\}\right\}$

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{x + x\sqrt{1-x^2},\ x + 2x\sqrt{1-x^2},\ x + 3x\sqrt{1-x^2},\ x + 4x\sqrt{1-x^2},\ x + 5x\sqrt{1-x^2}\right\}$$

```
Plot[Evaluate[tab], {x, -1, 2}, PlotRange → All, PlotStyle → {Thickness[0.006]}]
```



In[55]:= **Question 6**

Out[55]=

6 Question

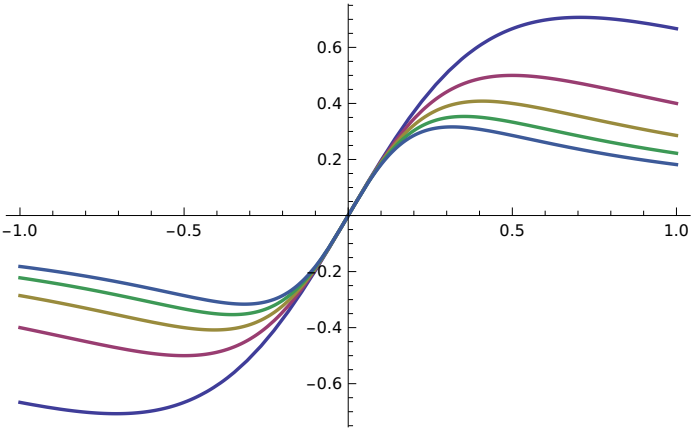
```
sol = DSolve[y'[x] * (x^2) + (y[x] * x) - y[x]^2 == 0 , y[x], x]
```

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

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{\frac{2x}{1+2x^2}, \frac{2x}{1+4x^2}, \frac{2x}{1+6x^2}, \frac{2x}{1+8x^2}, \frac{2x}{1+10x^2}\right\}$$

```
Plot[Evaluate[tab], {x, -1, 1}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```



In[56]:= **Question 7**

Out[56]=

7 Question

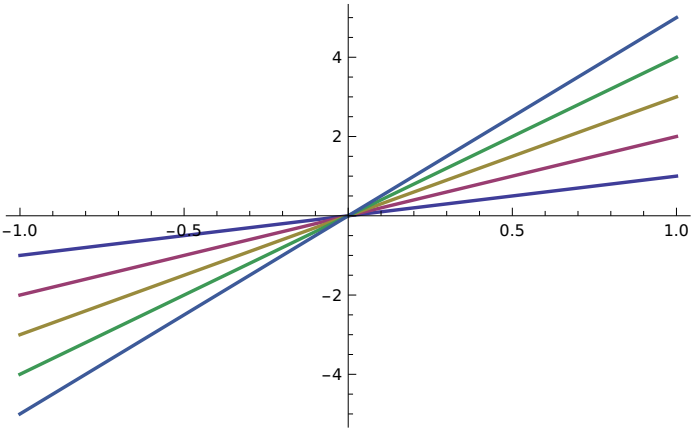
```
sol = DSolve[y'[x] * x - y[x] == 0 , y[x], x]
```

```
{{y[x] → x C[1]}}
```

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

```
{x, 2 x, 3 x, 4 x, 5 x}
```

```
Plot[Evaluate[tab], {x, -1, 1}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```



In[57]:= **Question 8**

Out[57]=

8 Question

```
sol = DSolve[y'[x] - Tan[y[x]] / (1 + x) == (1 + x) * Exp[x] * Sec[y[x]] , y[x], x]
```

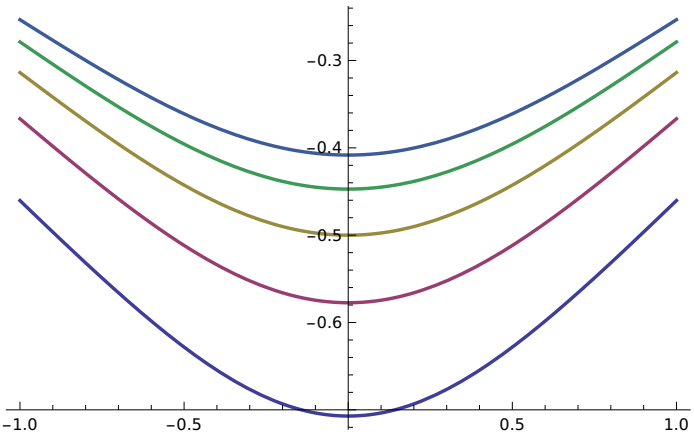
Solve::ifun : Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. >>

$$\{\{y[x] \to \text{ArcSin}[(1+x)(e^x + C[1])]\}\}$$

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\{\text{ArcSin}[(1+e^x)(1+x)], \text{ArcSin}[(2+e^x)(1+x)],$$
$$\text{ArcSin}[(3+e^x)(1+x)], \text{ArcSin}[(4+e^x)(1+x)], \text{ArcSin}[(5+e^x)(1+x)]\}$$

```
Plot[Evaluate[tab], {x, -1, 1}, PlotRange → All, PlotStyle → {Thickness[0.005]}]
```



In[58]:= **Question 9**

Out[58]=

9 Question

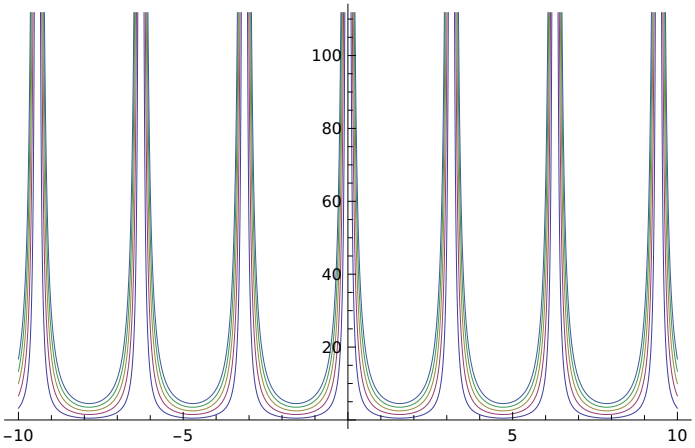
```
sol = DSolve[y'[x] + 2 * y[x] * Cot[x] + Sin[2 x] == 0 , y[x], x]
```

$$\left\{\left\{y[x] \to C[1]\,\text{Csc}[x]^2 - \frac{\text{Sin}[x]^2}{2}\right\}\right\}$$

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{\text{Csc}[x]^2 - \frac{\text{Sin}[x]^2}{2}, 2\,\text{Csc}[x]^2 - \frac{\text{Sin}[x]^2}{2}, 3\,\text{Csc}[x]^2 - \frac{\text{Sin}[x]^2}{2}, 4\,\text{Csc}[x]^2 - \frac{\text{Sin}[x]^2}{2}, 5\,\text{Csc}[x]^2 - \frac{\text{Sin}[x]^2}{2}\right\}$$

```
Plot[Evaluate[tab], {x, -10, 10}, PlotStyle → {Thickness[0.001]}]
```



In[60]:=
```
Question 10
```

Out[60]=

10 Question

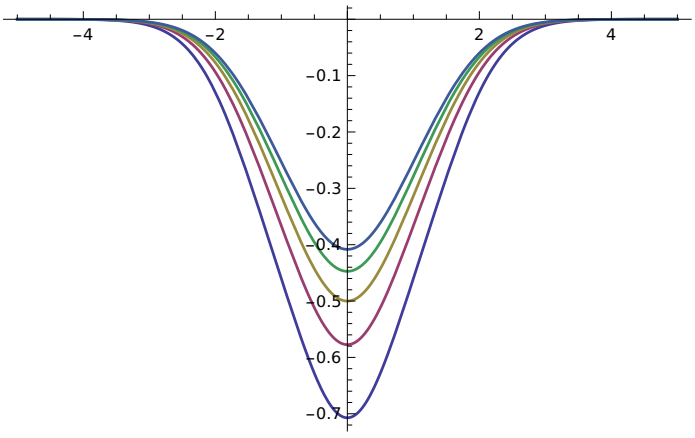
```
sol = DSolve[y '[x] - x ^ 3 * y[x] ^ 3 + x * y[x] == 0 , y[x], x]
```

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

```
tab = Table[y[x] /. sol[[1]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{-\frac{1}{\sqrt{1+e^{x^2}+x^2}},\ -\frac{1}{\sqrt{1+2\,e^{x^2}+x^2}},\ -\frac{1}{\sqrt{1+3\,e^{x^2}+x^2}},\ -\frac{1}{\sqrt{1+4\,e^{x^2}+x^2}},\ -\frac{1}{\sqrt{1+5\,e^{x^2}+x^2}}\right\}$$

```
Plot[Evaluate[tab], {x, -5, 5}, PlotRange → All, PlotStyle → {Thickness[0.004]}]
```




```
tab = Table[y[x] /. sol[[2]] /. {C[1] → k}, {k, 1, 5}]
```

$$\left\{\frac{1}{\sqrt{1+e^{x^2}+x^2}},\ \frac{1}{\sqrt{1+2\,e^{x^2}+x^2}},\ \frac{1}{\sqrt{1+3\,e^{x^2}+x^2}},\ \frac{1}{\sqrt{1+4\,e^{x^2}+x^2}},\ \frac{1}{\sqrt{1+5\,e^{x^2}+x^2}}\right\}$$

```
Plot[Evaluate[tab], {x, -5, 5}, PlotRange → All, PlotStyle → {Thickness[0.004]}]
```