In[19]:=
```
f = (2 x^3 - 7 x^2 + 2 x - 3) / (x - 3)^2
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -10, 10}]
```

Out[19]=
$$\frac{-3 + 2x - 7x^2 + 2x^3}{(-3 + x)^2}$$

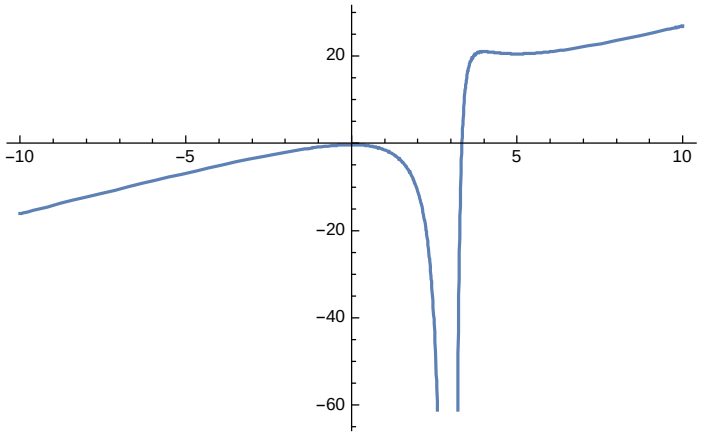
Out[20]=
$$\frac{2x\,(20 - 9x + x^2)}{(-3 + x)^3}$$

Out[21]= $\{\{x \to 0\}, \{x \to 4\}, \{x \to 5\}\}$

Out[22]=
$$\frac{4\,(-30 + 7x)}{(-3 + x)^4}$$

Out[23]= $\left\{\left\{x \to \frac{30}{7}\right\}\right\}$

Out[24]=



In[25]:=
```
f = (2 x^3 + 9 x^2 + 36 x + 36) / (x + 2)^2
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -10, 10}]
```

Out[25]=
$$\frac{36 + 36\,x + 9\,x^2 + 2\,x^3}{(2 + x)^2}$$

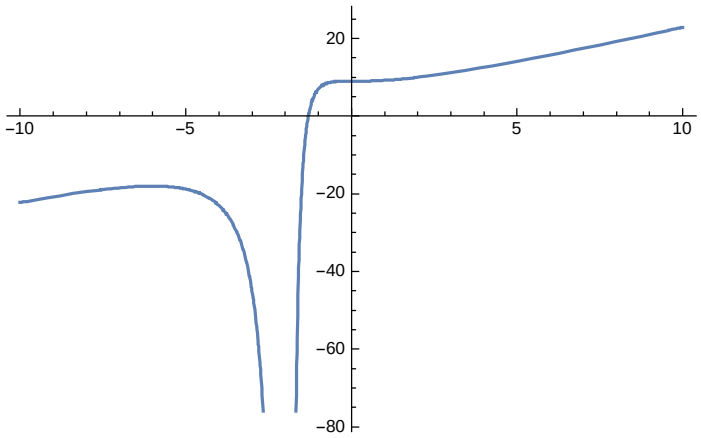
Out[26]=
$$\frac{2\,x^2\,(6 + x)}{(2 + x)^3}$$

Out[27]= {{x → -6}, {x → 0}, {x → 0}}

Out[28]=
$$\frac{48\,x}{(2 + x)^4}$$

Out[29]= {{x → 0}}

Out[30]=



In[31]:=
```
f = (x^3 + 4 x^2 + 11 x + 11) / (x + 2)^2
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -10, 10}]
```

Out[31]= $\frac{11 + 11\,x + 4\,x^2 + x^3}{(2 + x)^2}$

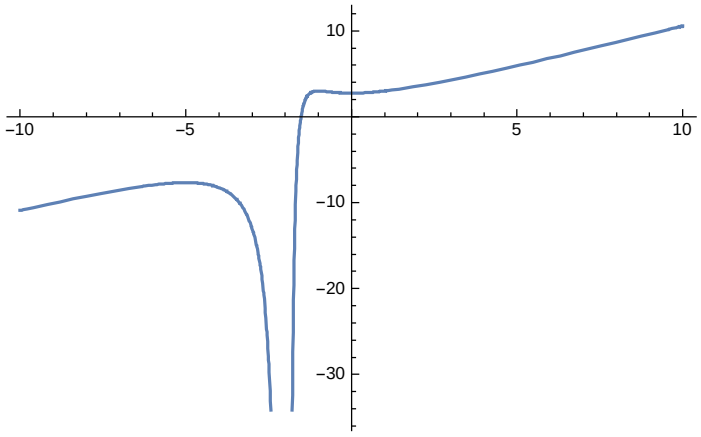
Out[32]= $\frac{x\,(5 + 6\,x + x^2)}{(2 + x)^3}$

Out[33]= $\{\{x \to -5\}, \{x \to -1\}, \{x \to 0\}\}$

Out[34]= $\frac{2\,(5 + 7\,x)}{(2 + x)^4}$

Out[35]= $\left\{\left\{x \to -\frac{5}{7}\right\}\right\}$

Out[36]=



In[49]:=
```
f = (8 x^3 - 16 x^2 + 22 x - 11) / (2 (x - 1)^2)
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -5, 5}]
```

Out[49]= $\frac{-11 + 22\,x - 16\,x^2 + 8\,x^3}{2\,(-1 + x)^2}$

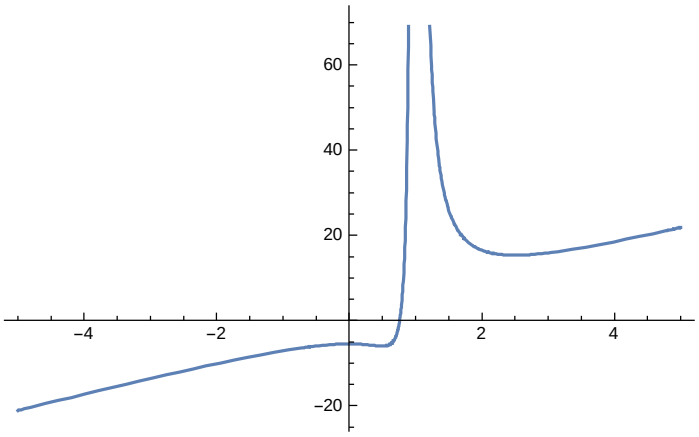
Out[50]= $\frac{x\,(5 - 12\,x + 4\,x^2)}{(-1 + x)^3}$

Out[51]= $\left\{\{x \to 0\}, \left\{x \to \frac{1}{2}\right\}, \left\{x \to \frac{5}{2}\right\}\right\}$

Out[52]= $\frac{-5 + 14\,x}{(-1 + x)^4}$

Out[53]= $\left\{\left\{x \to \frac{5}{14}\right\}\right\}$

Out[54]=



In[67]:=
```
f = (4 x^3 + 25 x^2 + 70 x + 105) / ((x + 3)^2)
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -15, 5}]
```

Out[67]=
$$\frac{105 + 70\,x + 25\,x^2 + 4\,x^3}{(3 + x)^2}$$

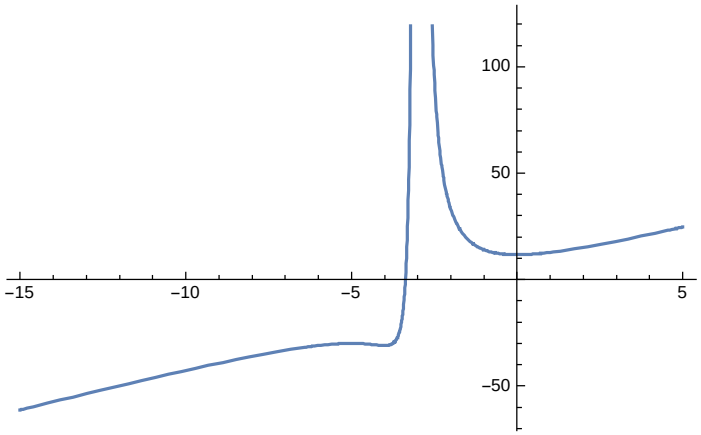
Out[68]=
$$\frac{4\,x\,(20 + 9\,x + x^2)}{(3 + x)^3}$$

Out[69]= $\{\{x \to -5\}, \{x \to -4\}, \{x \to 0\}\}$

Out[70]=
$$\frac{8\,(30 + 7\,x)}{(3 + x)^4}$$

Out[71]=
$$\left\{\left\{x \to -\frac{30}{7}\right\}\right\}$$

Out[72]=



In[79]:=
```
f = (x^3 + x^2 - 2 x + 1) / ((x - 1)^2)
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -5, 5}]
```

Out[79]=
$$\frac{1 - 2\,x + x^2 + x^3}{(-1 + x)^2}$$

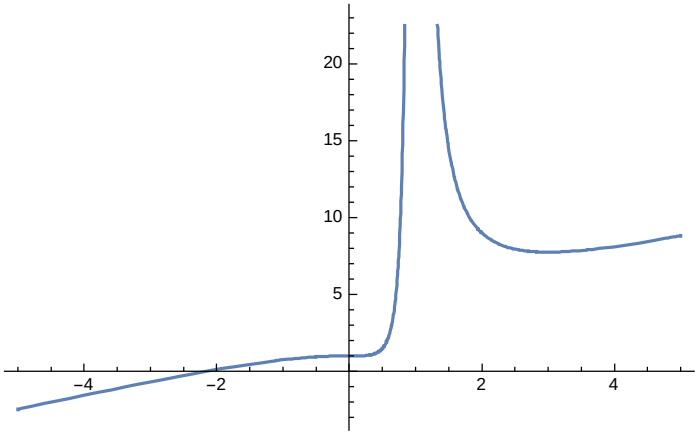
Out[80]=
$$\frac{(-3 + x)\,x^2}{(-1 + x)^3}$$

Out[81]= {{x → 0}, {x → 0}, {x → 3}}

Out[82]=
$$\frac{6\,x}{(-1 + x)^4}$$

Out[83]= {{x → 0}}

Out[84]=



In[115]:=
```
f = (x^3 + 6 x^2 + 46 x + 69) / ((x + 3) ^2)
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -15, 15}]
```

Out[115]= $\frac{69 + 46\,x + 6\,x^2 + x^3}{(3 + x)^2}$

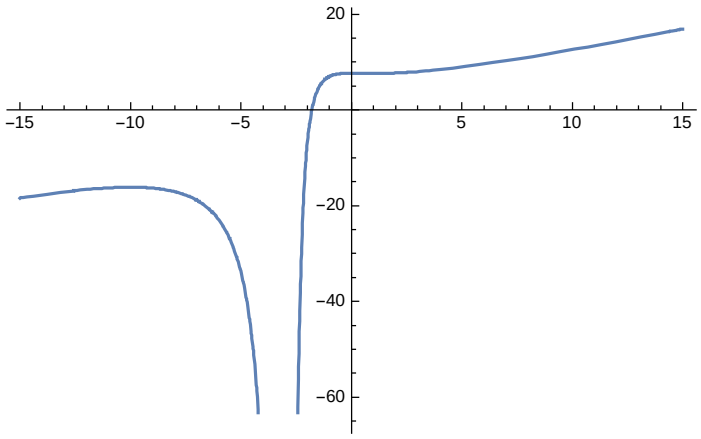
Out[116]= $\frac{x\,(-10 + 9\,x + x^2)}{(3 + x)^3}$

Out[117]= {{x → -10}, {x → 0}, {x → 1}}

Out[118]= $\frac{-30 + 74\,x}{(3 + x)^4}$

Out[119]= $\left\{\left\{x \to \frac{15}{37}\right\}\right\}$

Out[120]=



In[109]:=
```
f = (-x^3 + 8 x^2 - 28 x + 42) / ((x - 3) ^2)
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -5, 15}]
```

Out[109]= $\frac{42 - 28\,x + 8\,x^2 - x^3}{(-3 + x)^2}$

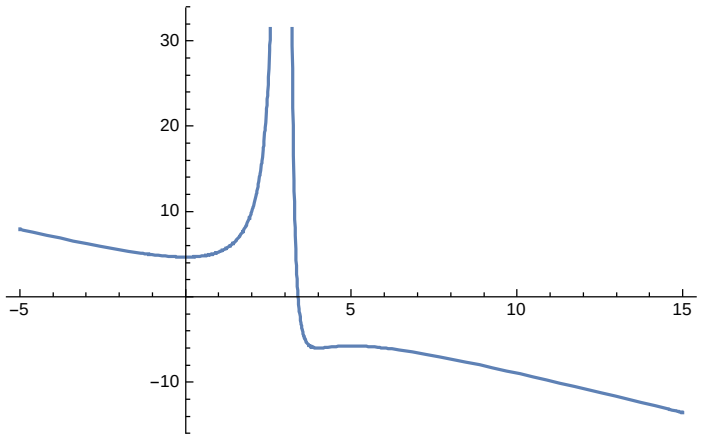
Out[110]= $-\frac{x\,(20 - 9\,x + x^2)}{(-3 + x)^3}$

Out[111]= {{x → 0}, {x → 4}, {x → 5}}

Out[112]= $\frac{60 - 14\,x}{(-3 + x)^4}$

Out[113]= $\left\{\left\{x \to \frac{30}{7}\right\}\right\}$

Out[114]=



In[127]:=
```
f = (x^3 - x^2 - x + 1) / ((x - 2)^2)
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -15, 15}]
```

Out[127]= $\frac{1 - x - x^2 + x^3}{(-2 + x)^2}$

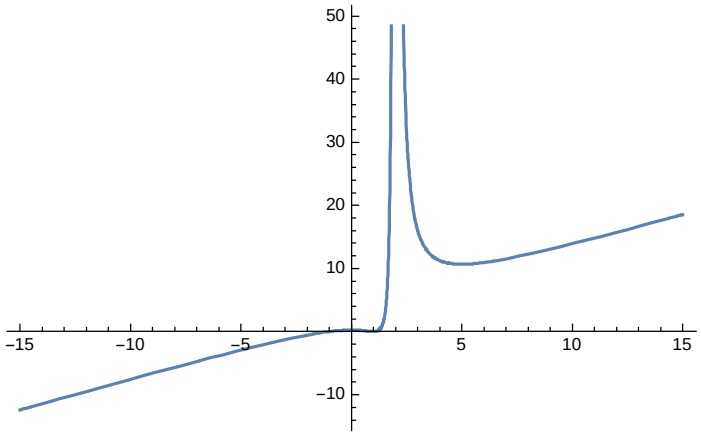
Out[128]= $\frac{x\,(5 - 6\,x + x^2)}{(-2 + x)^3}$

Out[129]= {{x → 0}, {x → 1}, {x → 5}}

Out[130]= $\frac{2\,(-5 + 7\,x)}{(-2 + x)^4}$

Out[131]= $\left\{\left\{x \to \frac{5}{7}\right\}\right\}$

Out[132]=



In[133]:=
```
f = (-x^3 + 11 x^2 - 44 x + 44) / ((x - 2) ^2)
df = D[f, x] // Simplify
Solve[df == 0, x]
ddf = D[df, x] // Simplify
Solve[ddf == 0, x]
Plot[f, {x, -15, 15}]
```

Out[133]= $\frac{44 - 44\,x + 11\,x^2 - x^3}{(-2 + x)^2}$

Out[134]= $-\frac{(-6 + x)\,x^2}{(-2 + x)^3}$

Out[135]= {{x → 0}, {x → 0}, {x → 6}}

Out[136]= $-\frac{24\,x}{(-2 + x)^4}$

Out[137]= {{x → 0}}

Out[138]=