1. Riešte diferenciálnu rovnicu x-yy'=0.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku:
a)y(2)=3
b)y(-3)=-1.
Nakreslite integrálne krivky partiklárnych riešení.

In[1]:= `LSR=Integrate[x,x]-Integrate[y,y]`

Out[1]= $\frac{x^2}{2}-\frac{y^2}{2}$

In[2]:= `r=Solve[LSR==c,y]`

Out[2]= $\{\{y\to -\sqrt{-2\,c+x^2}\},\{y\to \sqrt{-2\,c+x^2}\}\}$

In[3]:= `y1[x_]=y/.r[[1]]`

Out[3]= $-\sqrt{-2\,c+x^2}$

In[4]:= `y2[x_]=y/.r[[2]]`

Out[4]= $\sqrt{-2\,c+x^2}$

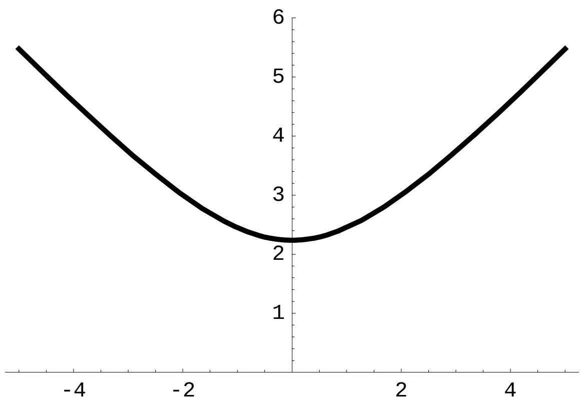
In[5]:= `pr1=Solve[y2[2]==3,c]`

Out[5]= $\{\{c\to -\frac{5}{2}\}\}$

In[6]:= `yP1[x_]=y2[x]/.pr1[[1]]`

Out[6]= $\sqrt{5+x^2}$

In[7]:=
```
kp1=Plot[yP1[x],{x,-5,5},PlotRange->{0,6},
PlotStyle->Thickness[0.009]]
```



Out[7]= - Graphics -

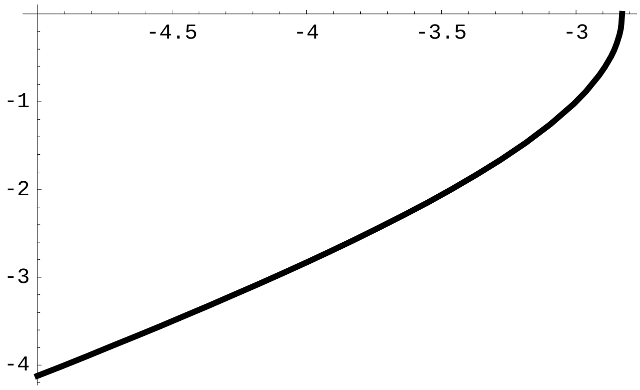
In[8]:= `pr2=Solve[y1[-3]==-1,c]`

Out[8]= $\{\{c\to 4\}\}$

In[9]:= `yP2[x_]=y1[x]/.pr2[[1]]`

Out[9]= $-\sqrt{-8+x^2}$

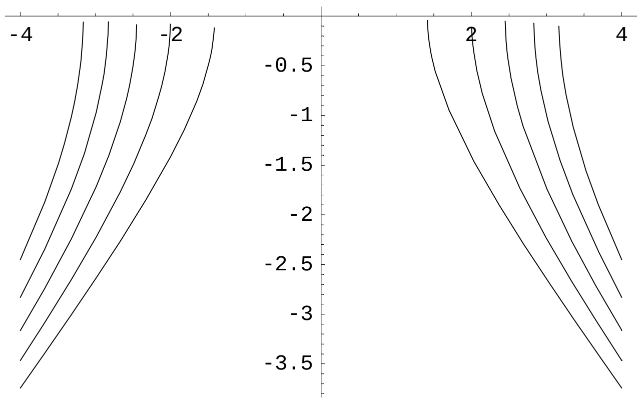
In[10]:= **kp2=Plot[yP2[x],{x,-5,-Sqrt[8]},**
PlotStyle->Thickness[0.01]]



Out[10]= - Graphics -

obl1=Table[Plot[y1[x],{x,-4,4}],{c,1,5}];

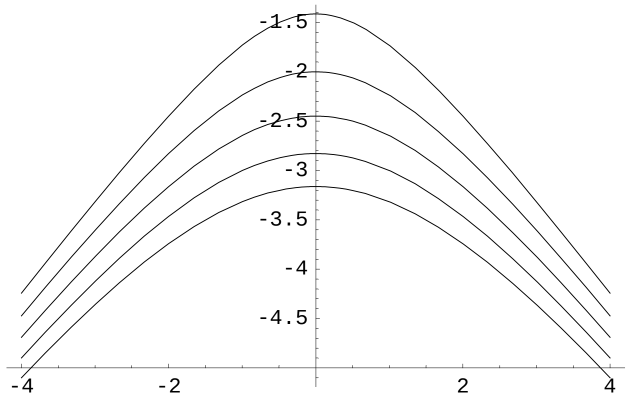
In[12]:= **Show[%]**



Out[12]= - Graphics -

In[13]:= **obl2=Table[Plot[y1[x],{x,-4,4}],{c,-5,-1}];**

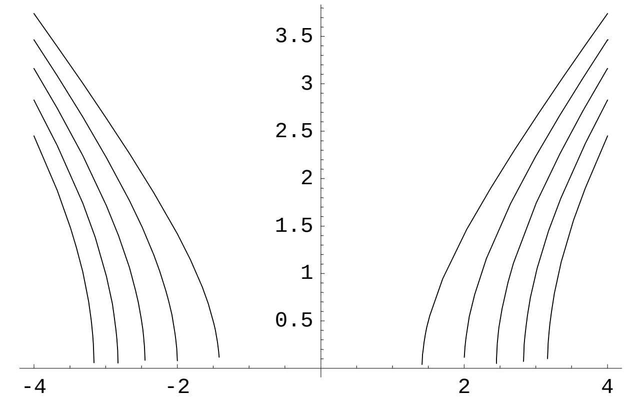
In[14]:= **Show[%]**



Out[14]= - Graphics -

In[15]:= **obl3=Table[Plot[y2[x],{x,-4,4}],{c,1,5}];**

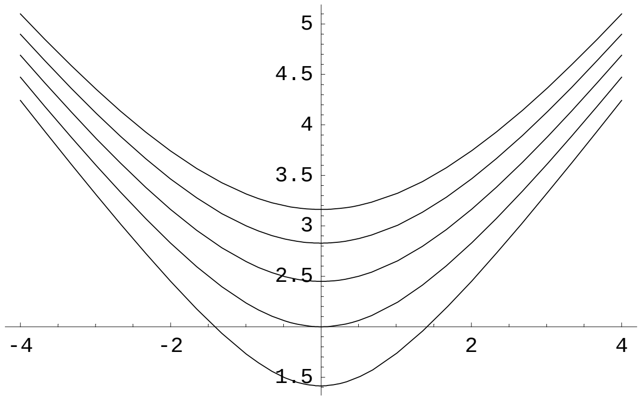
In[16]:= **Show[%]**



Out[16]= - Graphics -

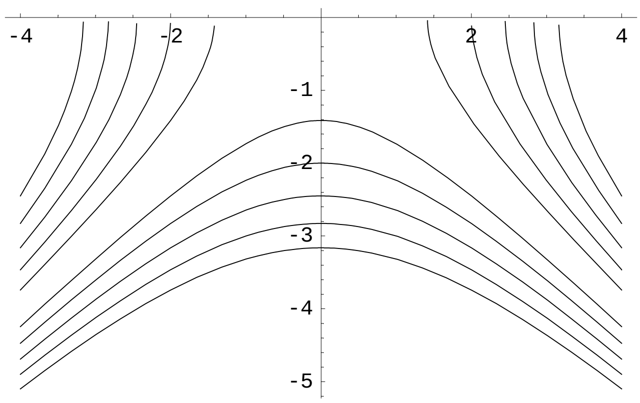
In[17]:= **obl4=Table[Plot[y2[x],{x,-4,4}],{c,-5,-1}];**

In[18]:= **Show[%]**



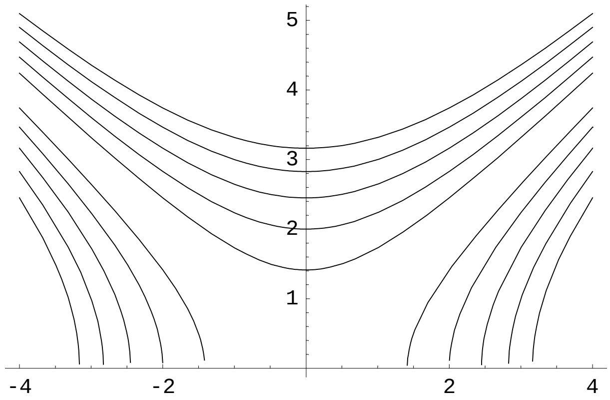
Out[18]= - Graphics -

In[19]:= **G1=Show[obl1,obl2]**



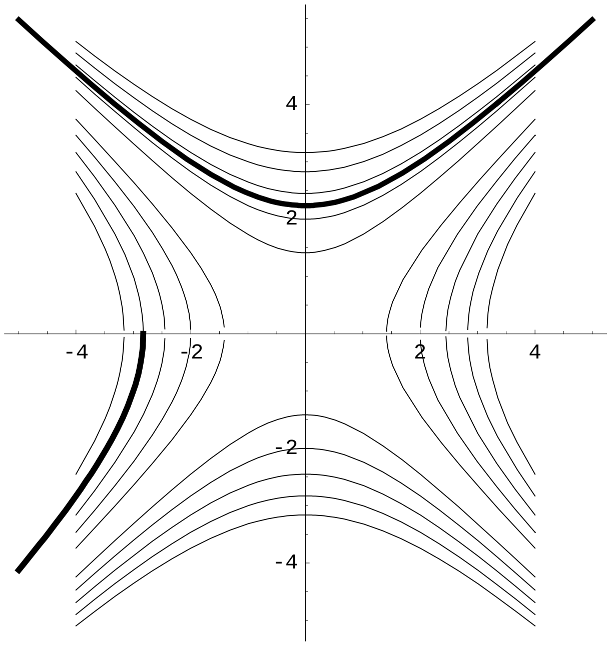
Out[19]= - Graphics -

In[20]:= **G2=Show[obl3,obl4]**



Out[20]= - Graphics -

In[21]:= **Show[G1,G2,kp1,kp2,AspectRatio->Automatic]**



Out[21]= - Graphics -

In[22]:= **DSolve[x-y[x]*y'[x]==0,y[x],x]**

Out[22]= $\left\{\left\{y[x] \to -\sqrt{x^2 + 2\, C[1]}\right\}, \left\{y[x] \to \sqrt{x^2 + 2\, C[1]}\right\}\right\}$

In[23]:= **DSolve[{x-y[x]*y'[x]==0,y[2]==3},y[x],x]**

Out[23]= $\left\{\left\{y[x] \to \sqrt{5 + x^2}\right\}\right\}$

In[24]:= **DSolve[{x-y[x]*y'[x]==0,y[-3]==-1},y[x],x]**

Out[24]= $\left\{\left\{y[x] \to -\sqrt{-8 + x^2}\right\}\right\}$

In[25]:= **Clear[y1,y2,y,yp,yp1,yp2]**

2. Riešte diferenciálnu rovnicu 1/(x-1)+1/y*y'=0.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku:
a)y(-2)=1
b)y(2)=1.
Nakreslite integrálne krivky partikulárnych riešení.

In[26]:= `DSolve[1/(x-1)+1/y[x]*y'[x]==0,y[x],x]`

Out[26]= $\{\{y[x] \to \frac{C[1]}{1-x}\}\}$

In[27]:= `y1[x_]=y[x]/.%[[1]]/.C[1]->c`

Out[27]= $\frac{c}{1-x}$

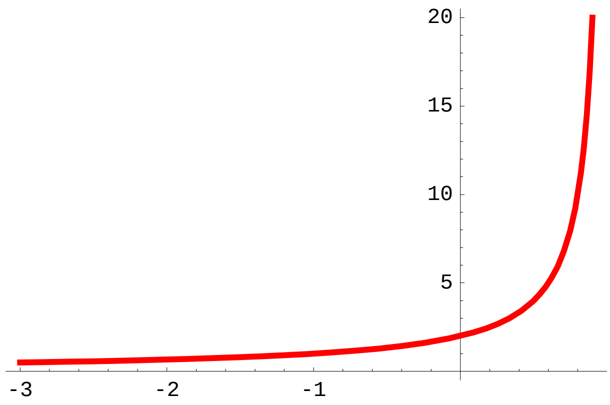
In[28]:= `r1=Solve[y1[-1]==1,c]`

Out[28]= $\{\{c \to 2\}\}$

In[29]:= `yp[x_]=y1[x]/.r1[[1]]`

Out[29]= $\frac{2}{1-x}$

In[30]:= `gyp=Plot[yp[x],{x,-3,0.9},`
`PlotStyle->{RGBColor[1, 0, 0],Thickness[0.01]}]`

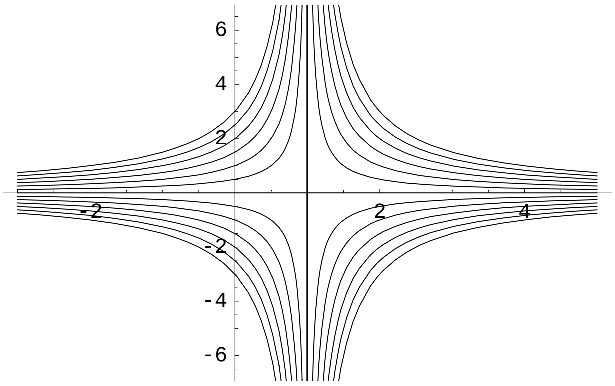


Out[30]= - Graphics -

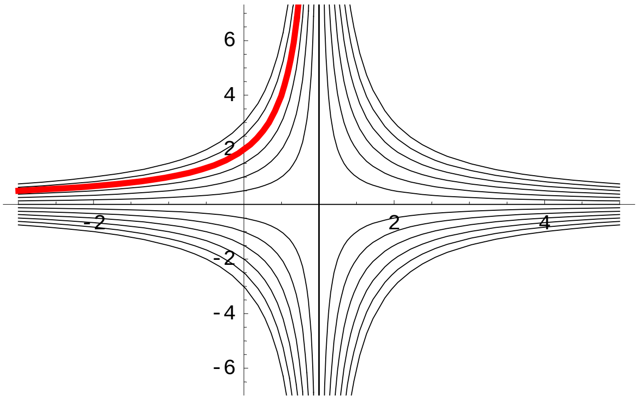
In[31]:= `t=Table[y1[x],{c,-3,3,0.5}]`

Out[31]= $\{-\frac{3}{1-x}, -\frac{2.5}{1-x}, -\frac{2.}{1-x}, -\frac{1.5}{1-x}, -\frac{1.}{1-x}, -\frac{0.5}{1-x}, \frac{0.}{1-x}, \frac{0.5}{1-x}, \frac{1.}{1-x}, \frac{1.5}{1-x}, \frac{2.}{1-x}, \frac{2.5}{1-x}, \frac{3.}{1-x}\}$

```
In[32]:= gvr3=Plot[Evaluate[t],{x,-3,5}]
```




```
Out[32]= - Graphics -

In[33]:= Show[gvr3,gyp]
```




```
Out[33]= - Graphics -

In[34]:= Solve[y1[2]==1,c]

Out[34]= {{c → -1}}

In[35]:= yp2[x_] = y1[x] /. %[[1]]
```

Out[35]= $-\frac{1}{1-x}$

```
In[36]:= Clear[y1,y]

In[37]:= DSolve[{1/(x-1)+1/y[x]*y'[x]==0, y[-2]==1},y[x],x]
```

Out[37]= $\{\{y[x] \to -\frac{3}{-1+x}\}\}$

```
In[38]:= DSolve[{1/(x-1)+1/y[x]*y'[x]==0, y[2]==1},y[x],x]
```

Out[38]= $\{\{y[x] \to \frac{1}{-1+x}\}\}$

```
In[39]:= Clear[y,y1,yp]
```

---

3. Riešte diferenciálnu rovnicu y+x*lnx*y'=0.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku y(e)=3.
Nakreslite integrálnu krivku partikulárneho riešenia.

```
In[40]:= DSolve[y[x]+x*Log[x]*y'[x]==0,y[x],x]
```

Out[40]= $\left\{\left\{y[x] \to \frac{C[1]}{Log[x]}\right\}\right\}$

```
In[41]:= y1[x_]=y[x]/.%[[1]]/.C[1]->c
```

Out[41]= $\frac{c}{Log[x]}$

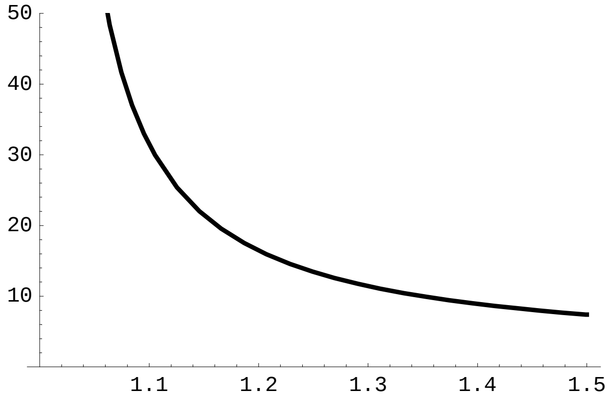
```
In[42]:= Solve[y1[E]==3,c]
```

Out[42]= $\{\{c \to 3\}\}$

```
In[43]:= yp[x_]=y1[x]/.c->3
```

Out[43]= $\frac{3}{Log[x]}$

```
In[44]:= gp=Plot[yp[x],{x,1.001,1.5},PlotRange->{0,50},
         PlotStyle->Thickness[0.008]]
```

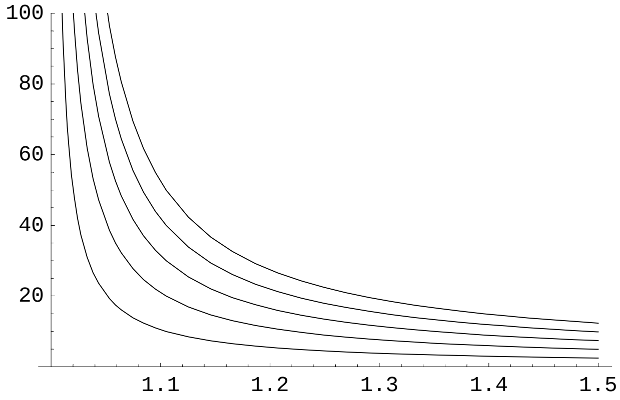


Out[44]= - Graphics -

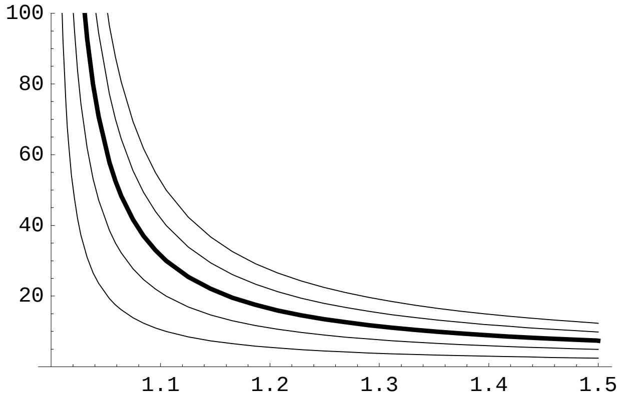
```
In[45]:= t3=Table[y1[x],{c,1,5}]
```

Out[45]= $\left\{\frac{1}{Log[x]}, \frac{2}{Log[x]}, \frac{3}{Log[x]}, \frac{4}{Log[x]}, \frac{5}{Log[x]}\right\}$

```
In[46]:= gvr=Plot[Evaluate[t3],{x,1.001,1.5},PlotRange->{0,100}]
```




```
Out[46]= - Graphics -

In[47]:= gvs=Show[gvr,gp]
```



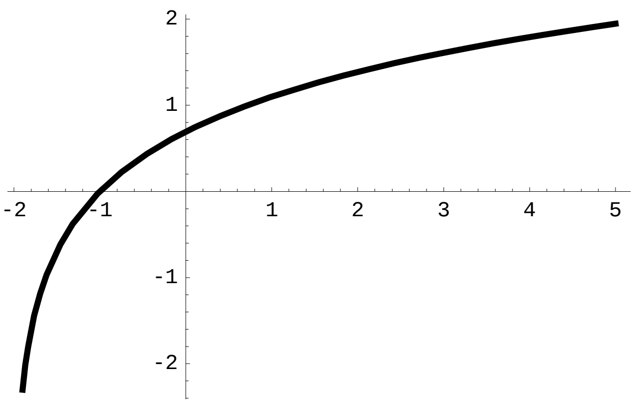

```
Out[47]= - Graphics -

In[48]:= Clear[y,y1,yp]

In[49]:= DSolve[{y[x]+x*Log[x]*y'[x]==0,y[E]==3},y[x],x]
```

Out[49]= $\left\{\left\{y[x] \to \frac{3}{\mathrm{Log}[x]}\right\}\right\}$

```
In[50]:= Clear[y1,y,yp]
```

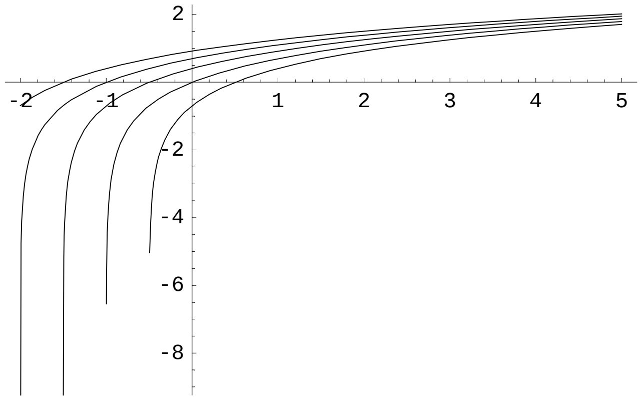
4. Riešte diferenciálnu rovnicu y'e^y-1=0.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku y(-1)=0.
Nakreslite integrálnu krivku partikulárneho riešenia.
Vypočitajte hodnotu partikulárneho riešenia pre y(0), y(-1.5).

```
In[51]:= DSolve[y'[x]*Exp[y[x]]-1==0,y[x],x]

Out[51]= {{y[x] → Log[x + C[1]]}}

In[52]:= y1[x_]=y[x]/.%[[1]]/.C[1]->c

Out[52]= Log[c + x]

In[53]:= Solve[y1[-1]==0,c]

Out[53]= {{c → 2}}

In[54]:= yp[x_]=y1[x]/.c->2

Out[54]= Log[2 + x]

In[55]:= gp=Plot[yp[x],{x,-1.9,5},PlotStyle->Thickness[0.01]]
```



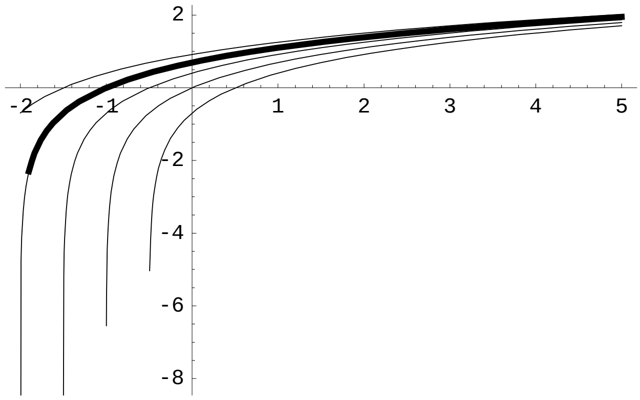

```
Out[55]= - Graphics -

In[56]:= t=Table[y1[x],{c,0.5,2.5,0.5}]

Out[56]= {Log[0.5 + x], Log[1. + x], Log[1.5 + x], Log[2. + x], Log[2.5 + x]}
```

```
In[57]:= gvs=Plot[Evaluate[t],{x,-2,5}]
```




```
Out[57]= - Graphics -
```

```
In[58]:= Show[gvs,gp]
```




```
Out[58]= - Graphics -

In[59]:= yp[0]//N

Out[59]= 0.693147

In[60]:= yp[-1.5]

Out[60]= -0.693147

In[61]:= Clear[y,yp,y1,gvs,gp]
```

5. Riešte difrenciálnu rovnicu x+y^3y'=0.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku y(2)=5.
Nakreslite integrálnu krivku partikulárneho riešenia.
Vypočitajte hodnotu partikulárnehho riešenia y(1.58).

In[62]:= `r=DSolve[x+y[x]^3*y'[x]==0,y[x],x]`

Out[62]= $\{\{y[x] \to -2^{1/4}(-x^2+2C[1])^{1/4}\}, \{y[x] \to -i\, 2^{1/4}(-x^2+2C[1])^{1/4}\}, \{y[x] \to i\, 2^{1/4}(-x^2+2C[1])^{1/4}\}, \{y[x] \to 2^{1/4}(-x^2+2C[1])^{1/4}\}\}$

In[63]:= `y1[x_]=y[x]/.r[[1]]/.C[1]->c`

Out[63]= $-2^{1/4}(2c-x^2)^{1/4}$

In[64]:= `y2[x_]=y[x]/.r[[4]]/.C[1]->c`

Out[64]= $2^{1/4}(2c-x^2)^{1/4}$

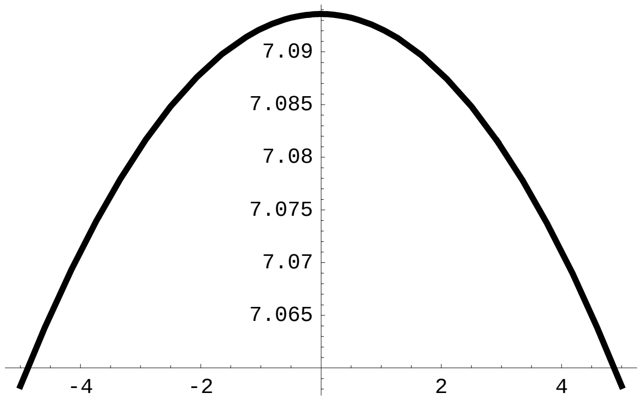
In[65]:= `Solve[y2[2]==5,c]`

Out[65]= $\{\{c \to \frac{633}{4}\}\}$

In[66]:= `yp[x_]=y2[x]/.c->633`

Out[66]= $2^{1/4}(1266-x^2)^{1/4}$

In[67]:= `gp=Plot[yp[x],{x,-5,5},PlotStyle->Thickness[0.01]]`



Out[67]= - Graphics -

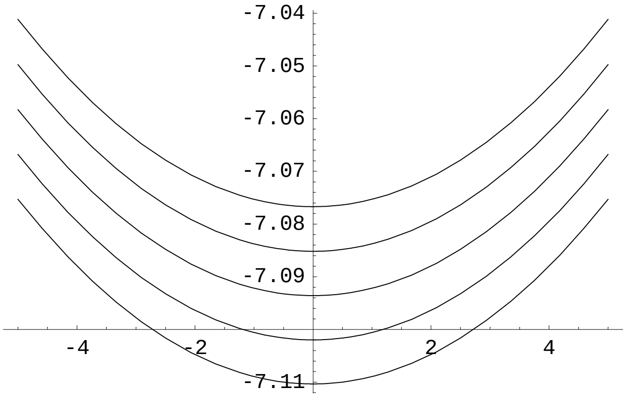
In[68]:= `t1=Table[y1[x],{c,627,639,3}]`

Out[68]= $\{-2^{1/4}(1254-x^2)^{1/4}, -2^{1/4}(1260-x^2)^{1/4}, -2^{1/4}(1266-x^2)^{1/4}, -2^{1/4}(1272-x^2)^{1/4}, -2^{1/4}(1278-x^2)^{1/4}\}$

In[69]:= `t2=Table[y2[x],{c,627,639,3}]`

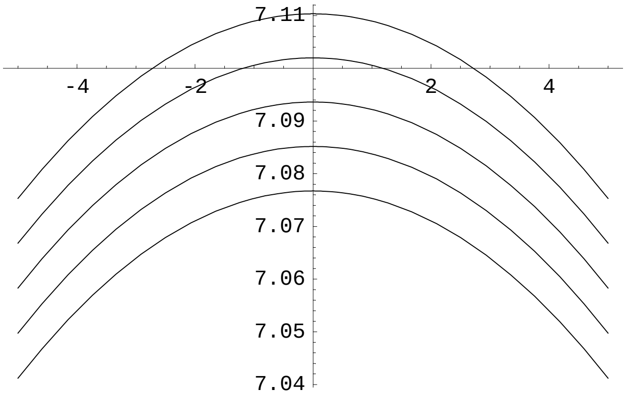
Out[69]= $\{2^{1/4}(1254-x^2)^{1/4}, 2^{1/4}(1260-x^2)^{1/4}, 2^{1/4}(1266-x^2)^{1/4}, 2^{1/4}(1272-x^2)^{1/4}, 2^{1/4}(1278-x^2)^{1/4}\}$

In[70]:= **k1=Plot[Evaluate[t1],{x,-5,5}]**



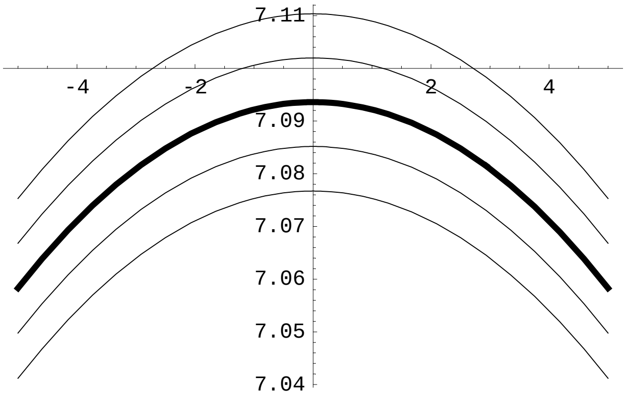
Out[70]= - Graphics -

In[71]:= **k2=Plot[Evaluate[t2],{x,-5,5}]**



Out[71]= - Graphics -

In[72]:= **Show[k2,gp]**



Out[72]= - Graphics -

In[73]:= **Clear[y2,y1,y,yp]**

In[74]:= **DSolve[{x+y[x]^3*y'[x]==0,y[2]==5},y[x],x]**

Out[74]= $\{\{y[x] \to (633 - 2x^2)^{1/4}\}\}$

In[75]:= **Clear[y, y1, y2, x]**

---

6. Riešte diferenciálnu rovnicu y'- 2y/x = (x^3) cos(x).
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku y(2)=5.
Nakreslite integrálnu krivku partikulárneho riešenia.
Vypočitajte y(1.2).

--

```
In[76]:= r=DSolve[y'[x]-2*y[x]/x==(x^3)*Cos[x],y[x],x]
```

Out[76]= $\{\{y[x] \to x^2 C[1] + x^2 (\text{Cos}[x] + x \,\text{Sin}[x])\}\}$

```
In[77]:= y1[x_]=y[x]/.r[[1]]/.C[1]->c
```

Out[77]= $c\, x^2 + x^2 (\text{Cos}[x] + x\, \text{Sin}[x])$

```
In[78]:= Clear[y]
```

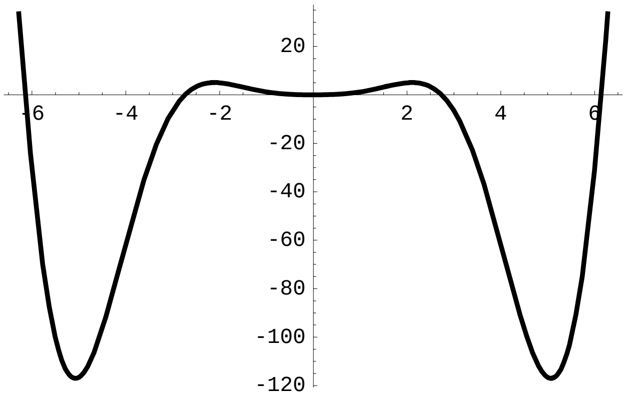
```
In[79]:= rp=DSolve[{y'[x]-2*y[x]/x==(x^3)*Cos[x],y[2]==5},
         y[x],x]
```

Out[79]= $\left\{\left\{y[x] \to \frac{1}{4} (5 x^2 - 4 x^2 \text{Cos}[2] + 4 x^2 \text{Cos}[x] - 8 x^2 \text{Sin}[2] + 4 x^3 \text{Sin}[x])\right\}\right\}$

```
In[80]:= yp[x_]=y[x]/.rp[[1]]
```

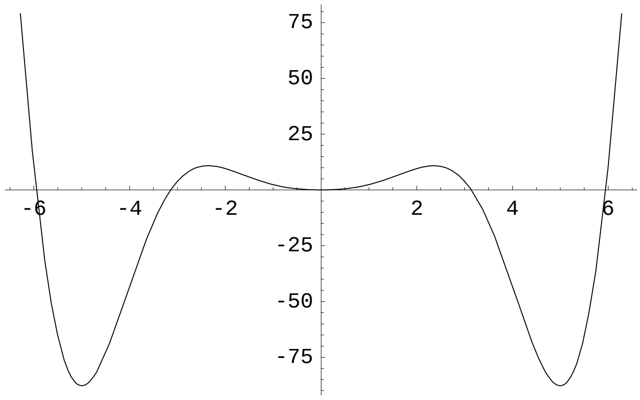
Out[80]= $\frac{1}{4} (5 x^2 - 4 x^2 \text{Cos}[2] + 4 x^2 \text{Cos}[x] - 8 x^2 \text{Sin}[2] + 4 x^3 \text{Sin}[x])$

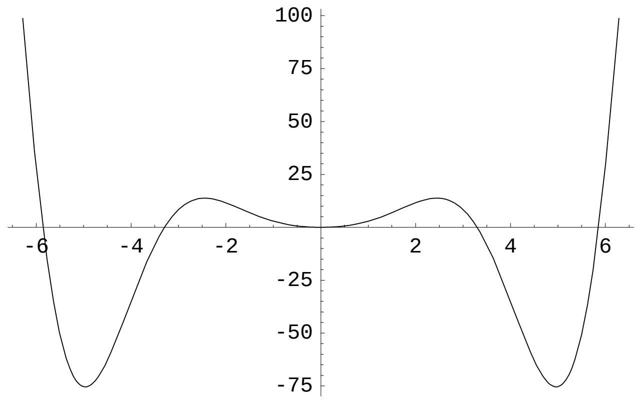
```
In[81]:= gp=Plot[yp[x],{x,-2Pi,2Pi},
         PlotStyle->Thickness[0.008]]
```

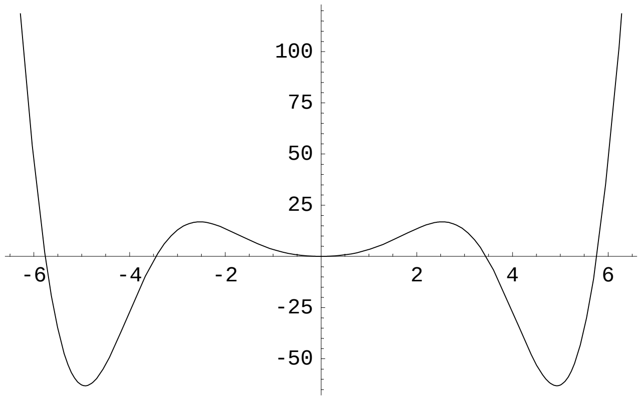


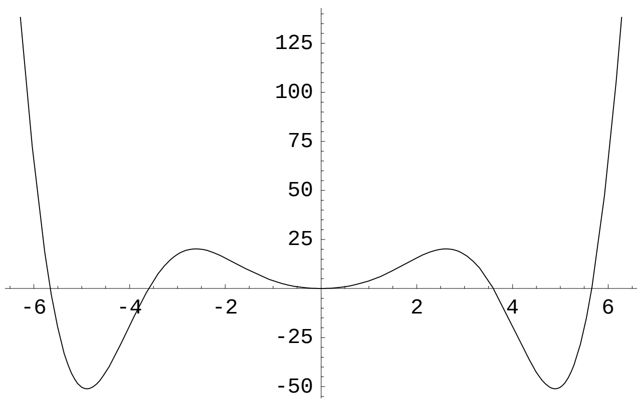
Out[81]= - Graphics -

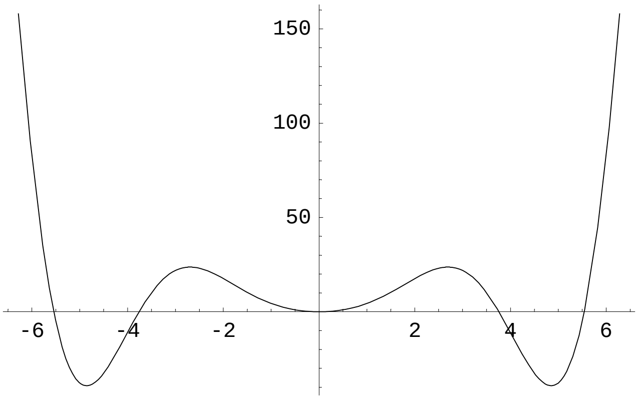
```
In[82]:= gvr=Table[Plot[y1[x],{x,-2Pi,2Pi}],
         {c,1,3,0.5}]
```


75
50
25
-6
-4
-2
2
4
6
-25
-50
-75


100
75
50
25
-6
-4
-2
2
4
6
-25
-50
-75

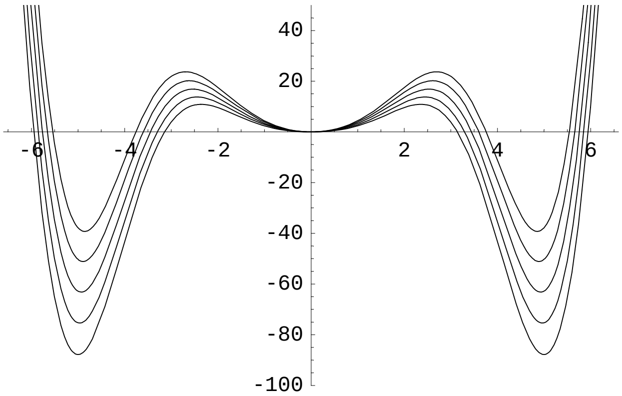

100
75
50
25
-6
-4
-2
2
4
6
-25
-50


125
100
75
50
25
-6
-4
-2
2
4
6
-25
-50



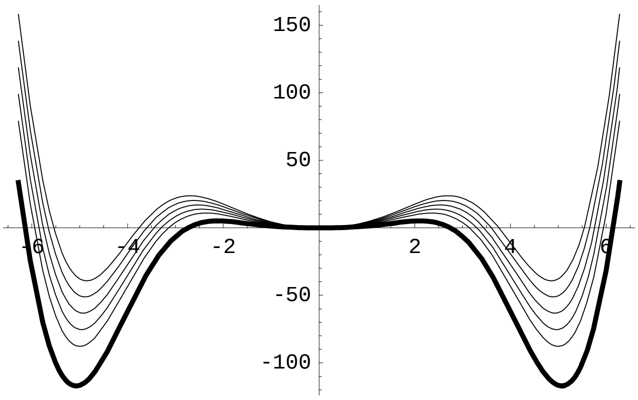
Out[82]= {- Graphics -, - Graphics -, - Graphics -, - Graphics -, - Graphics -}

In[83]:= **gvs=Show[gvr,PlotRange->{-100,50}]**



Out[83]= - Graphics -

In[84]:= **Show[gp,gvr]**



Out[84]= - Graphics -

In[85]:= **yp[1.2]//N**

Out[85]= 1.91283

In[86]:= **Clear[y,yp,y1,gp,gvs]**

7. Riešte diferenciálnu rovnicu y'-cot(x)*y=(sin(x))^3.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku y(Pi/2)=1.
Nakreslite integrálnu krivku partikulárneho riešenia.

In[87]:= `r=DSolve[y'[x]-Cot[x]*y[x]==Sin[x]^3,y[x],x]`

Out[87]= $\left\{\left\{y[x] \to C[1]\,\mathrm{Sin}[x] + \mathrm{Sin}[x]\left(\frac{x}{2} - \frac{1}{4}\mathrm{Sin}[2\,x]\right)\right\}\right\}$

In[88]:= `y1[x_]=y[x]/.r[[1]]/.C[1]->c`

Out[88]= $c\,\mathrm{Sin}[x] + \mathrm{Sin}[x]\left(\frac{x}{2} - \frac{1}{4}\mathrm{Sin}[2\,x]\right)$

In[89]:= `Clear[y]`

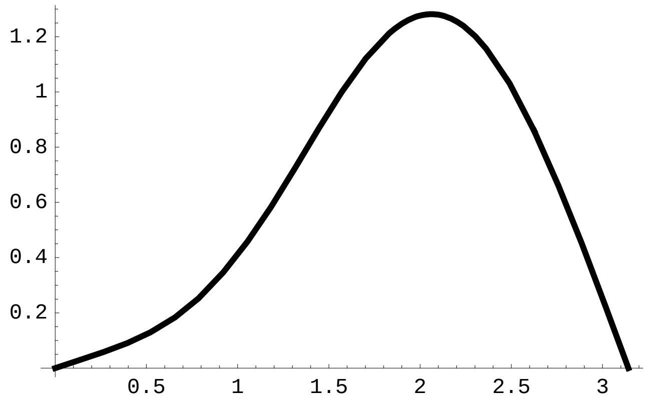
In[90]:= `DSolve[{y'[x]-Cot[x]*y[x]==Sin[x]^3,y[Pi/2]==1},y[x],x]`

Out[90]= $\left\{\left\{y[x] \to \frac{1}{4}\left(4\,\mathrm{Sin}[x] - \pi\,\mathrm{Sin}[x] + 2\,x\,\mathrm{Sin}[x] - \mathrm{Sin}[x]\,\mathrm{Sin}[2\,x]\right)\right\}\right\}$

In[91]:= `yp[x_]=y[x]/.%[[1]]`

Out[91]= $\frac{1}{4}\left(4\,\mathrm{Sin}[x] - \pi\,\mathrm{Sin}[x] + 2\,x\,\mathrm{Sin}[x] - \mathrm{Sin}[x]\,\mathrm{Sin}[2\,x]\right)$

In[92]:= `gp=Plot[yp[x],{x,0,Pi},PlotStyle->Thickness[0.01]]`

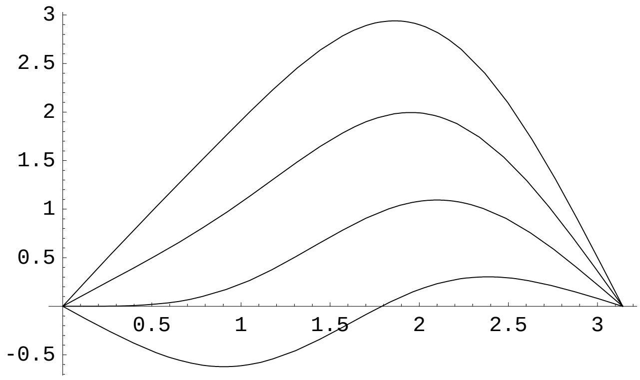


Out[92]= - Graphics -

In[93]:= `t=Table[y1[x],{c,-1,2}]`

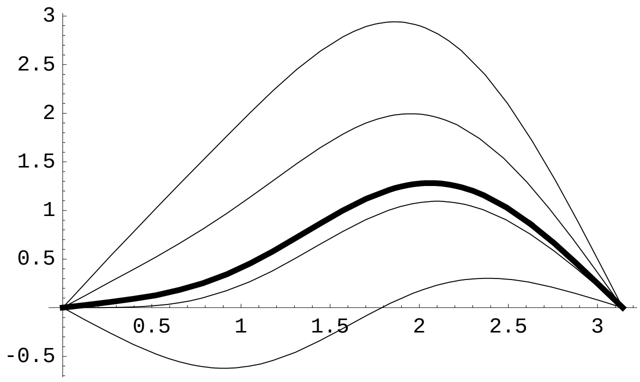
Out[93]= $\left\{-\mathrm{Sin}[x] + \mathrm{Sin}[x]\left(\frac{x}{2} - \frac{1}{4}\mathrm{Sin}[2\,x]\right),\ \mathrm{Sin}[x]\left(\frac{x}{2} - \frac{1}{4}\mathrm{Sin}[2\,x]\right),\ \mathrm{Sin}[x] + \mathrm{Sin}[x]\left(\frac{x}{2} - \frac{1}{4}\mathrm{Sin}[2\,x]\right),\ 2\,\mathrm{Sin}[x] + \mathrm{Sin}[x]\left(\frac{x}{2} - \frac{1}{4}\mathrm{Sin}[2\,x]\right)\right\}$

```
In[94]:= k1=Plot[Evaluate[t],{x,0,Pi}]
```




```
Out[94]= -Graphics-
```

```
In[95]:= Show[k1,gp]
```




```
Out[95]= -Graphics-
```

8. Riešte diferenciálnu rovnicu (1+x)y'+x(1-y)=0.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku: y(1)=-1
Nakreslite graf partikulárneho riešenia.

In[96]:= `r=DSolve[(1+x)*y'[x]-x(1-y[x])==0,y[x],x]`

Out[96]= $\{\{y[x] \to 1 + e^{-x}\,(1+x)\,C[1]\}\}$

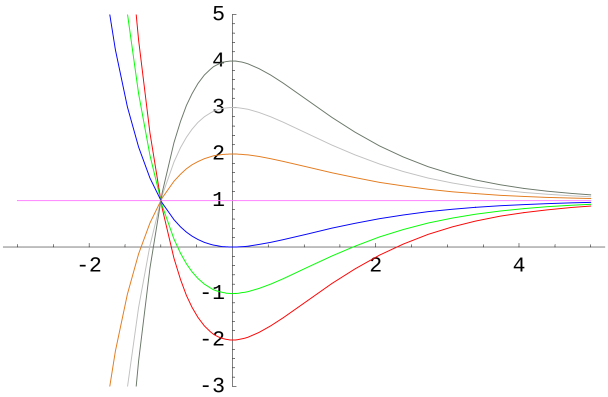
In[97]:= `y1[x_]=y[x]/.r[[1]]/.C[1]->c`

Out[97]= $1 + c\,e^{-x}\,(1+x)$

In[98]:= `t=Table[y1[x],{c,-3,3}]`

Out[98]= $\{1-3\,e^{-x}\,(1+x),\ 1-2\,e^{-x}\,(1+x),\ 1-e^{-x}\,(1+x),\ 1,\ 1+e^{-x}\,(1+x),\ 1+2\,e^{-x}\,(1+x),\ 1+3\,e^{-x}\,(1+x)\}$

In[99]:=
```
gvr=Plot[Evaluate[t],{x,-3,5},
PlotRange->{-3,5},PlotStyle->{RGBColor[1,0,0],RGBColor[0,1,0],
RGBColor[0.000,0.000,1.000],RGBColor[1.000,0.502,1.000],
RGBColor[0.886,0.478,0.114],RGBColor[0.753,0.753,0.753],
RGBColor[0.416,0.467,0.408]}]
```



Out[99]= - Graphics -

In[100]:=
`Solve[y1[1]==-1,c]`

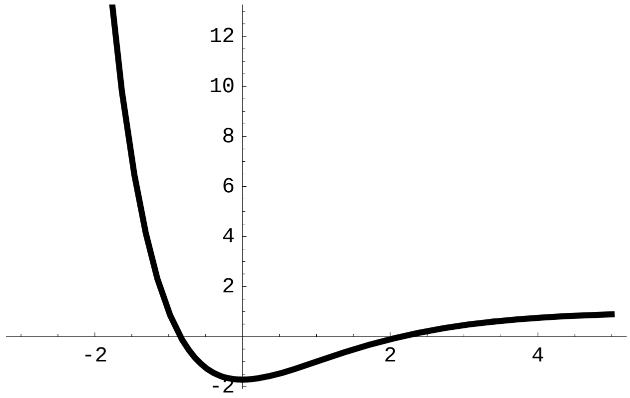
Out[100]=
$\{\{c \to -e\}\}$

In[101]:=
`yp[x_]=y1[x]/.c->-E`

Out[101]=
$1 - e^{1-x}\,(1+x)$

In[102]:=

```
gp=Plot[yp[x],{x,-3,5},PlotStyle->Thickness[0.01]]
```

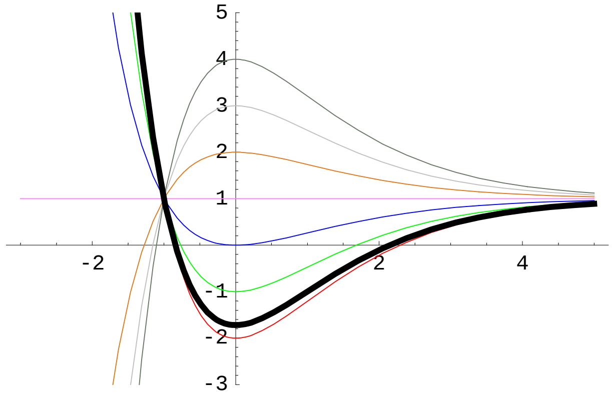


Out[102]=

- Graphics -

In[103]:=

```
Show[gvr,gp]
```



Out[103]=

- Graphics -

9. Riešte diferenciálnu rovnicu y''+2y'+y=cosx.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku:
y(0)=0
y'(0)=0.
Nakreslite graf partikulárneho riešenia.

In[104]:=
```
DSolve[y''[x]+2y'[x]+y[x]==0,y[x],x]
```
Out[104]=
$$\{\{y[x] \to e^{-x} C[1] + e^{-x} x C[2]\}\}$$

In[105]:=
```
r=DSolve[y''[x]+2y'[x]+y[x]==Cos[x],y[x],x]
```
Out[105]=
$$\left\{\left\{y[x] \to e^{-x} C[1] + e^{-x} x C[2] + \frac{\text{Sin}[x]}{2}\right\}\right\}$$

In[106]:=
```
y1[x_]=y[x]/.r[[1]]/.C[1]->c1/.C[2]->c2
```
Out[106]=
$$c1\, e^{-x} + c2\, e^{-x} x + \frac{\text{Sin}[x]}{2}$$

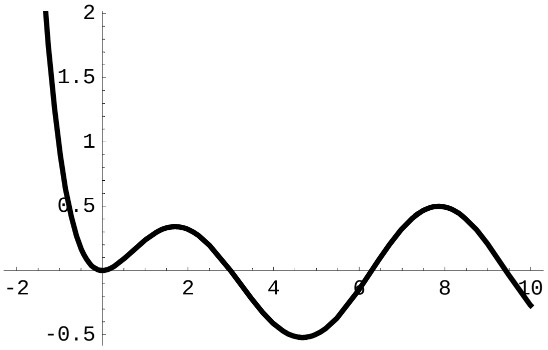
In[107]:=
```
pr=DSolve[{y''[x]+2y'[x]+y[x]==Cos[x],y[0]==0,y'[0]==0},
y[x],x]
```
Out[107]=
$$\left\{\left\{y[x] \to \frac{1}{2} e^{-x} (-x + e^{x} \text{Sin}[x])\right\}\right\}$$

In[108]:=
```
Solve[{y1[0]==0,y1'[0]==0},{c1,c2}]
```
Out[108]=
$$\left\{\left\{c1 \to 0,\ c2 \to -\frac{1}{2}\right\}\right\}$$

In[109]:=
```
yp[x_]=y1[x]/.{c1->0,c2->-1/2}
```
Out[109]=
$$-\frac{1}{2} e^{-x} x + \frac{\text{Sin}[x]}{2}$$

In[110]:=

```
gp=Plot[yp[x],{x,-2,10},PlotStyle->Thickness[0.01]]
```

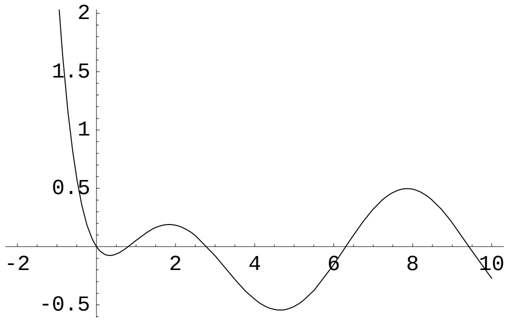


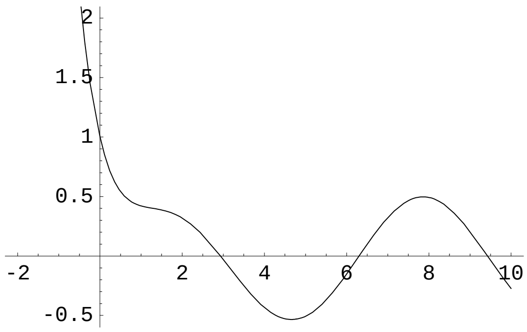
Out[110]=

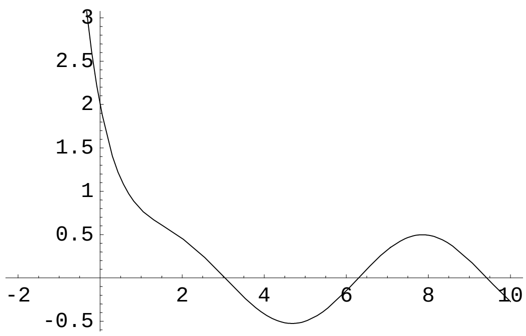
- Graphics -

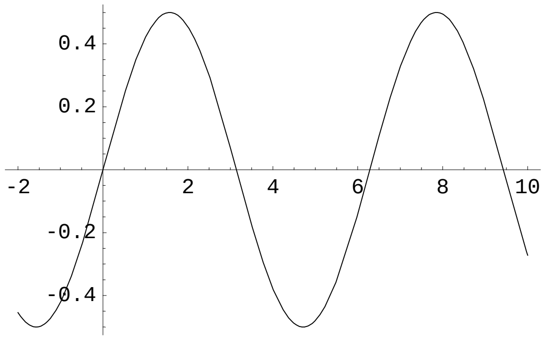
In[111]:=

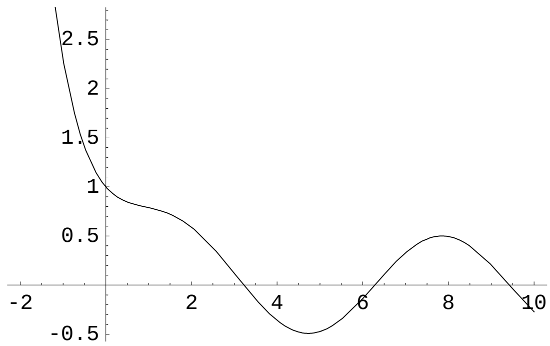
```
Table[Table[Plot[y1[x],{x,-2,10}],{c1,0,2}],{c2,-1,1}]
```

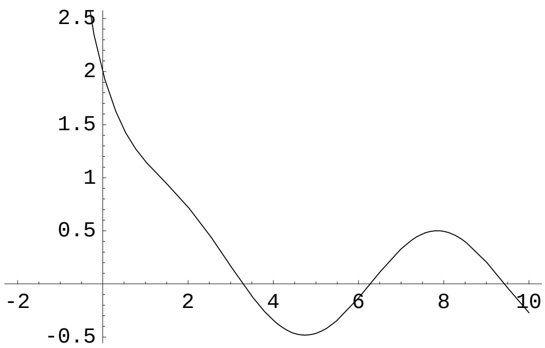


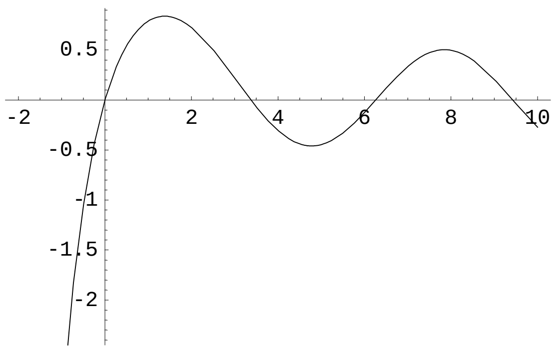


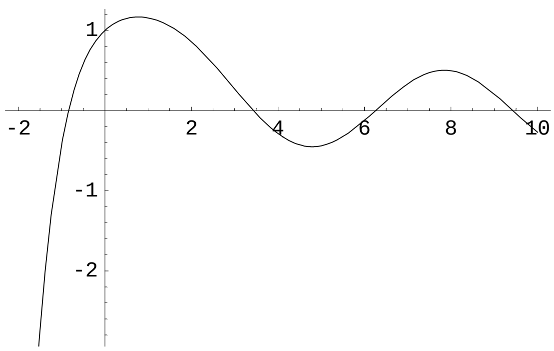


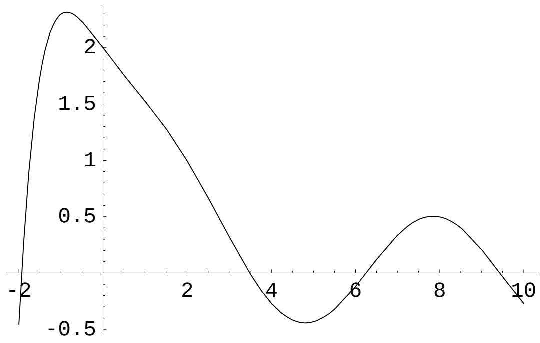

0.4
0.2
-2
2
4
6
8
10
-0.2
-0.4


2.5
2
1.5
1
0.5
-2
2
4
6
8
10
-0.5


2.5
2
1.5
1
0.5
-2
2
4
6
8
10
-0.5


0.5
-2
2
4
6
8
10
-0.5
-1
-1.5
-2


1
-2
2
4
6
8
10
-1
-2

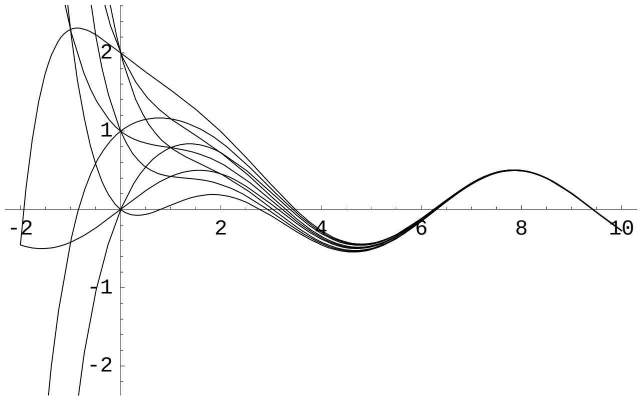


Out[111]=

```
{{- Graphics -, - Graphics -, - Graphics -},
 {- Graphics -, - Graphics -, - Graphics -}, {- Graphics -, - Graphics -, - Graphics -}}
```

In[112]:=

```
gvs=Show[%]
```

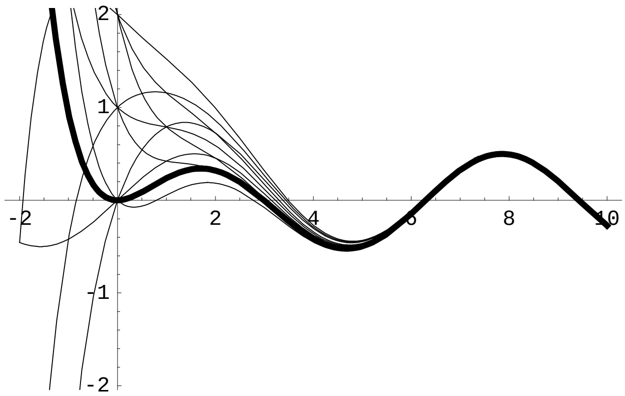


Out[112]=

```
- Graphics -
```

In[113]:=

```
Show[gvs,gp]
```



Out[113]=

```
- Graphics -
```

In[114]:=

```
Clear[y,yp,y1,gvs,gp]
```

10. Riešte diferenciálnu rovnicu y''+y=xe^(-x).
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku:
y(-1)=1, y'(0)=0
Nakreslite graf partikulárneho riešenia.

In[115]:=

```
r=DSolve[y''[x]+y[x]==x*Exp[-x],y[x],x]
```

Out[115]=

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

In[116]:=

```
y1[x_]=y[x]/.r[[1]]/.C[1]->c/.C[2]->d
```

Out[116]=

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

In[117]:=

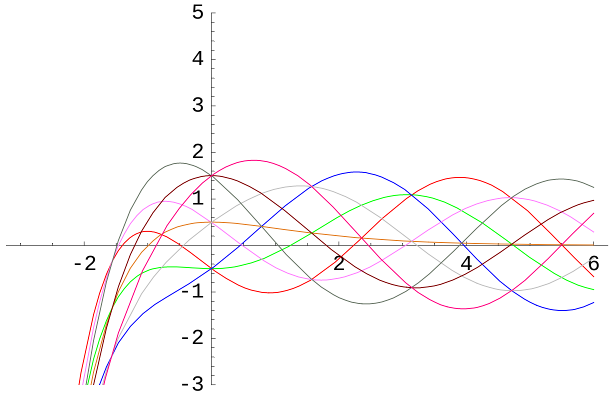
```
t=Table[y1[x],{c,-1,1},{d,-1,1}]
```

Out[117]=

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

In[118]:=

```
gvr=Plot[Evaluate[t],{x,-3,6},
PlotRange->{-3,5},PlotStyle->{RGBColor[1,0,0],RGBColor[0,1,0],
RGBColor[0.000,0.000,1.000],RGBColor[1.000,0.502,1.000],
RGBColor[0.886,0.478,0.114],RGBColor[0.753,0.753,0.753],
RGBColor[0.416,0.467,0.408],RGBColor[0.501961, 0, 0],
RGBColor[1, 0, 0.501961],RGBColor[0, 0.25098, 0]}]
```



Out[118]=

- Graphics -

In[119]:=

```
rp=DSolve[{y''[x]+y[x]==x*Exp[-x],y[0]==1,y'[0]==1},y[x],x]
```

Out[119]=

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

In[120]:=

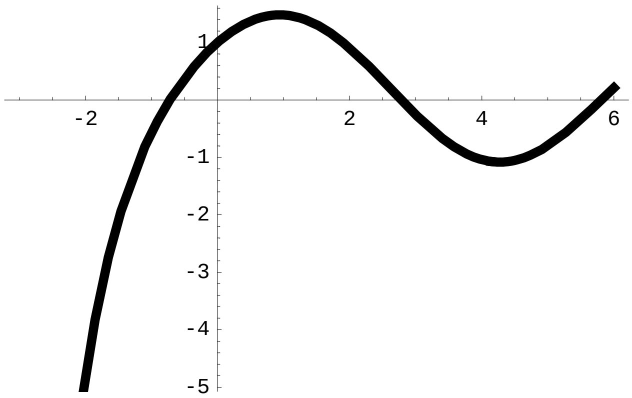
```
yp[x_]=y[x]/.rp[[1]]
```

Out[120]=

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

In[121]:=

```
gp=Plot[yp[x],{x,-3,6},PlotStyle->Thickness[0.015]]
```

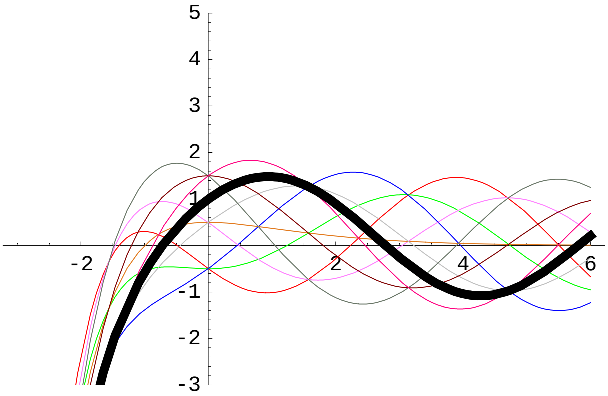


Out[121]=

- Graphics -

In[122]:=

```
Show[gvr,gp]
```



Out[122]=

```
- Graphics -
```

In[123]:=

```
Clear[y, y1, yp]
```

10. Riešte diferenciálnu rovnicu y''+y'=4x+1.
Nájdite partikulárne riešenie, ktoré spĺňa zač. podmienku:
y(-1)=1, y'(0)=0
Nakreslite graf partikulárneho riešenia.

In[124]:=

```
r=DSolve[y''[x]+y'[x]==4x+1,y[x],x]
```

Out[124]=

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

In[125]:=

```
y1[x_]=y[x]/.r[[1]]/.C[1]->c/.C[2]->d
```

Out[125]=

$$d - c\, e^{-x} - 3x + 2x^2$$

In[126]:=

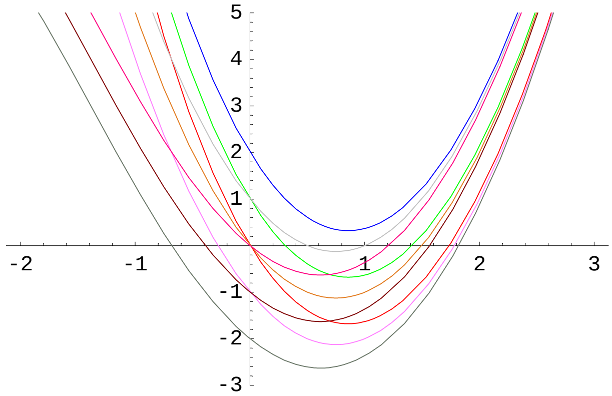
```
t=Table[y1[x],{c,-1,1},{d,-1,1}]
```

Out[126]=

$$\{\{-1 + e^{-x} - 3x + 2x^2,\ e^{-x} - 3x + 2x^2,\ 1 + e^{-x} - 3x + 2x^2\},$$
$$\{-1 - 3x + 2x^2,\ -3x + 2x^2,\ 1 - 3x + 2x^2\},$$
$$\{-1 - e^{-x} - 3x + 2x^2,\ -e^{-x} - 3x + 2x^2,\ 1 - e^{-x} - 3x + 2x^2\}\}$$

In[127]:=

```
gvr=Plot[Evaluate[t],{x,-2,3},
PlotRange->{-3,5},PlotStyle->{RGBColor[1,0,0],RGBColor[0,1,0],
RGBColor[0.000,0.000,1.000],RGBColor[1.000,0.502,1.000],
RGBColor[0.886,0.478,0.114],RGBColor[0.753,0.753,0.753],
RGBColor[0.416,0.467,0.408],RGBColor[0.501961, 0, 0],
RGBColor[1, 0, 0.501961],RGBColor[0, 0.25098, 0]}]
```



Out[127]=

- Graphics -

In[128]:=

```
rp=DSolve[{y''[x]+y'[x]==4x+1,y[0]==1,y'[0]==-3},y[x],x]
```

Out[128]=

$$\{\{y[x] \to 1 - 3x + 2x^2\}\}$$

In[129]:=

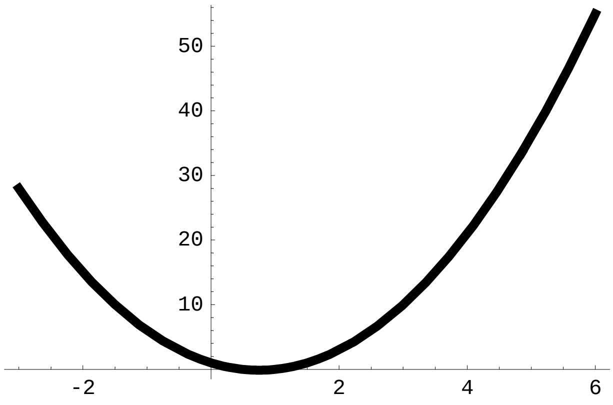
```
yp[x_]=y[x]/.rp[[1]]
```

Out[129]=

$1-3x+2x^2$

In[130]:=

```
gp=Plot[yp[x],{x,-3,6},PlotStyle->Thickness[0.015]]
```

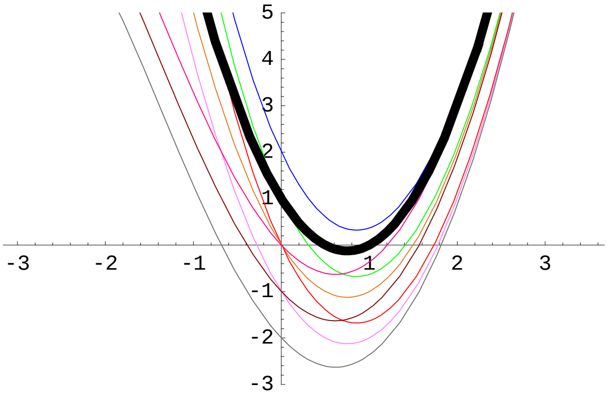


Out[130]=

- Graphics -

In[131]:=

```
Show[gvr,gp]
```



Out[131]=

- Graphics -