```
(**********************************************)
(**************** Fourier sorok **************)
(**********************************************)

n = 8;          (* fokszám *)
ω = π;          (* félperiódus *)
f[x_] = Sin[x]^4;
f[x_] = x^2; (* függvény - mindig a legutolsó számít *)
(***********************************************)
```

$$A0 = \frac{1}{\omega}\int_{-\omega}^{\omega} f[x]\, dx;$$

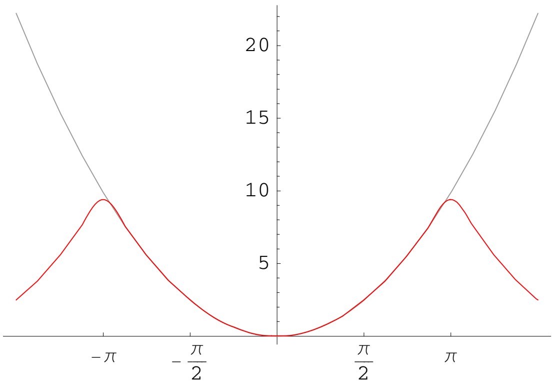
$$A = Table\left[\frac{1}{\omega}\int_{-\omega}^{\omega} f[x]\, Cos\left[\frac{k\pi x}{\omega}\right] dx,\ \{k, 1, n\}\right];$$

$$B = Table\left[\frac{1}{\omega}\int_{-\omega}^{\omega} f[x]\, Sin\left[\frac{k\pi x}{\omega}\right] dx,\ \{k, 1, n\}\right];$$

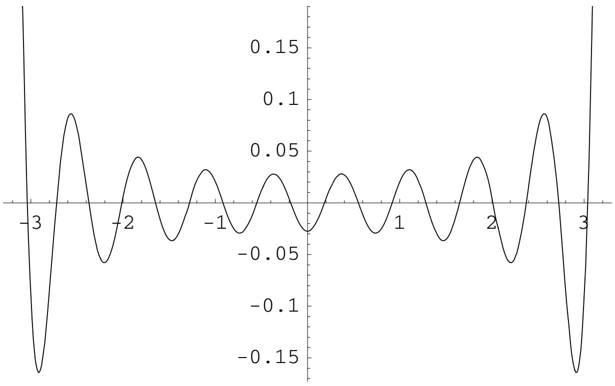
$$FourierSor[x\_] = \frac{A0}{2} + \sum_{k=1}^{n}\left(A[[k]]\, Cos\left[\frac{k\pi}{\omega} x\right] + B[[k]]\, Sin\left[\frac{k\pi}{\omega} x\right]\right);$$

$$Plot\left[\{f[x], FourierSor[x]\}, \{x, -3\pi/2, 3\pi/2\}, Ticks \to \left\{\left\{-\pi, -\frac{\pi}{2}, \frac{\pi}{2}, \pi\right\}, Automatic\right\}, PlotStyle \to \{GrayLevel[0.6], Hue[0]\}\right]$$

```
(*az n=8-hoz tartozó Fourier polinom és az x^2 fgv. ábrája*)
Plot[f[x] - FourierSor[x], {x, -π, π}] (*a Fourier sor hibája*)
```



- Graphics -

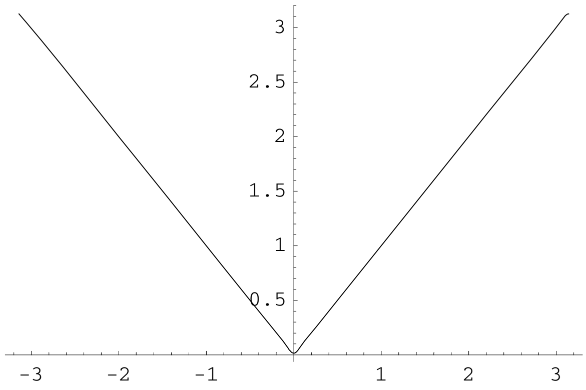


- Graphics -

```
(* abszolútérték függvény*)
n = 20;
```

$$g[x\_] = \frac{\pi}{2} + \sum_{k=0}^{n} \left(\frac{-4}{(2k+1)^2 \pi} \text{Cos}[(2k+1)x] \right);$$

```
Plot[g[x], {x, -π, π}, PlotRange → All]
```

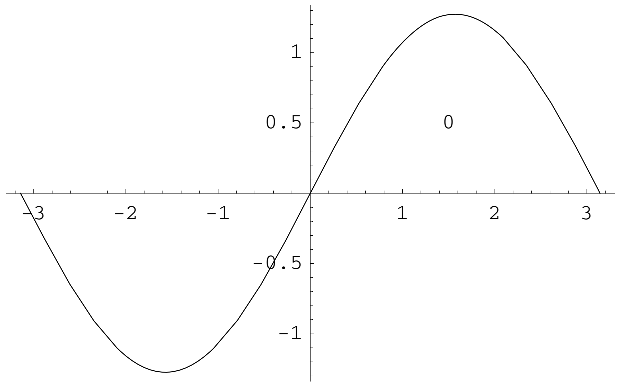


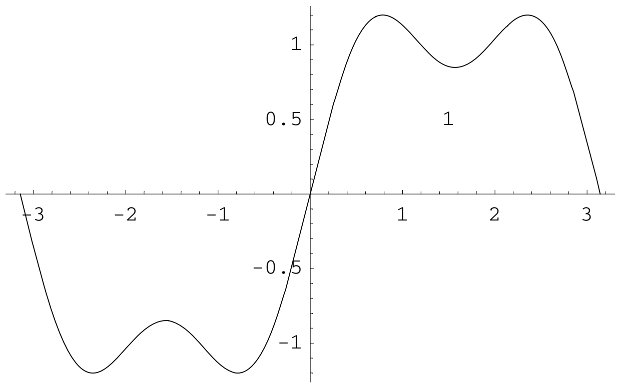
Out[6]= - Graphics -

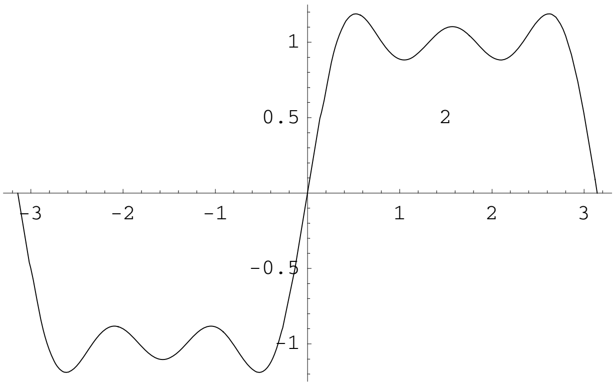
```
(*az egységugrás függvény első 15 Fourier polinomja *)
<< Graphics`Animation`
j = Table[
```

$$\left\{\text{Show}\left[\text{Plot}\left[\sum_{k=0}^{i} \left(\frac{4}{(2k+1)\pi} \text{Sin}[(2k+1)x] \right), \{x, -\pi, \pi\}, \text{DisplayFunction} \to \text{Identity}\right]\right],\right.$$

```
    Graphics[Text[i, {1.5, 0.5}]]}, {i, 0, 15}];
ShowAnimation[j, DisplayFunction → $DisplayFunction];
```



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1
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3
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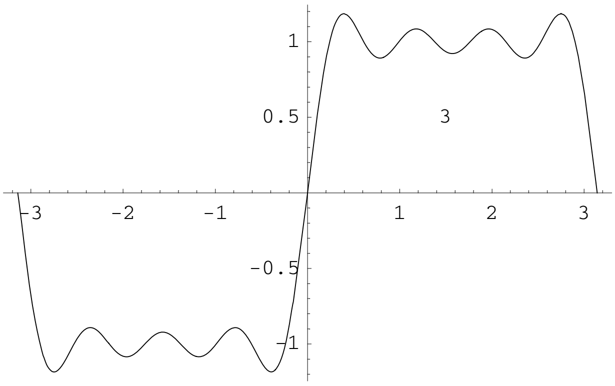
-1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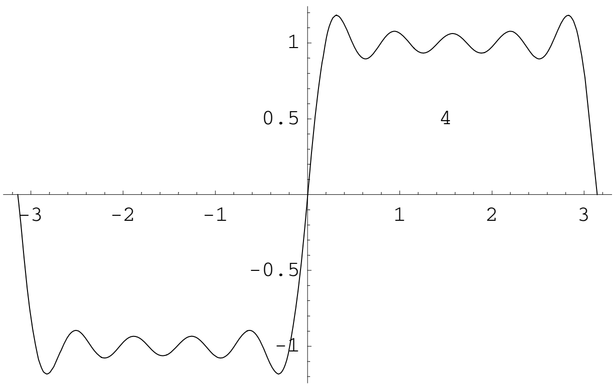
-1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3
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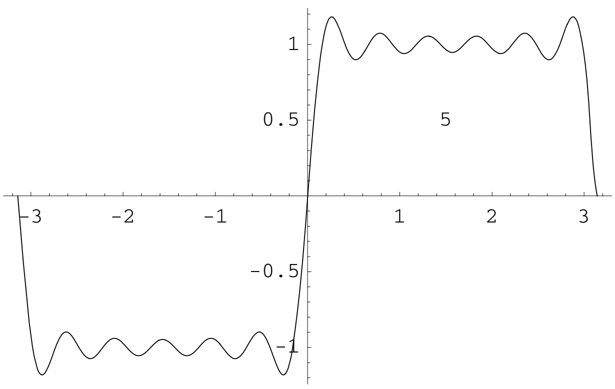
-1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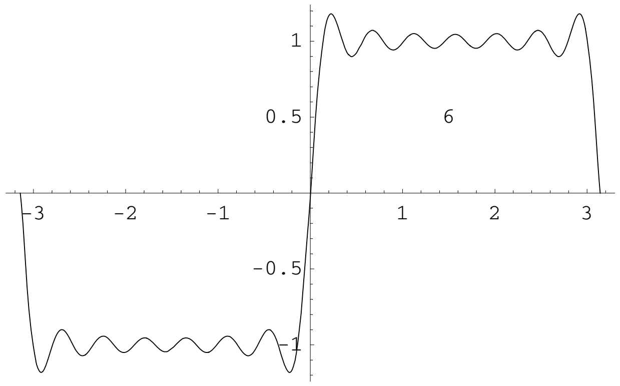
2
3
-0.5
-1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-3
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-1
1
2
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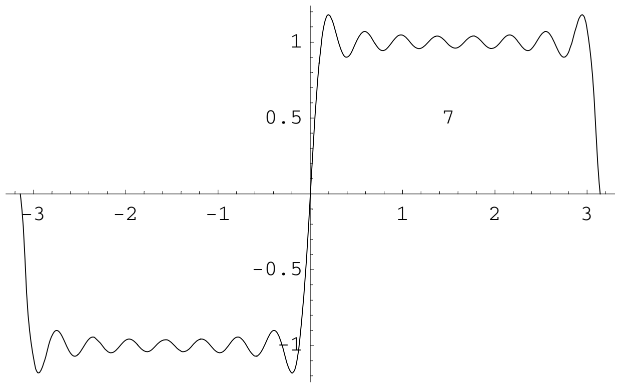
-0.5
-1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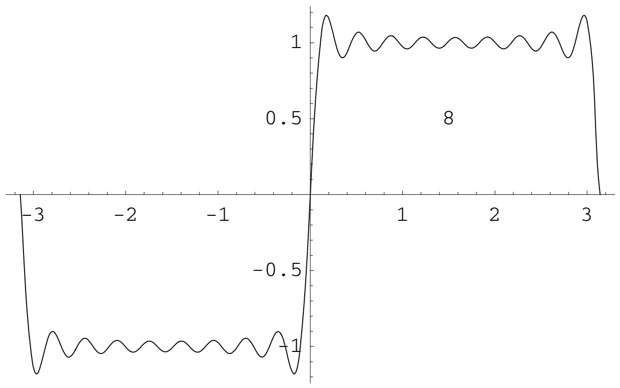
-3
-2
-1
1
2
3
-0.5
-1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-3
-2
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1
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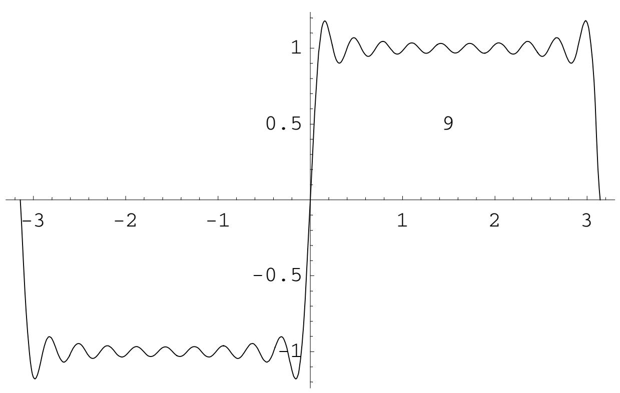
3
-0.5
-1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-1
1
2
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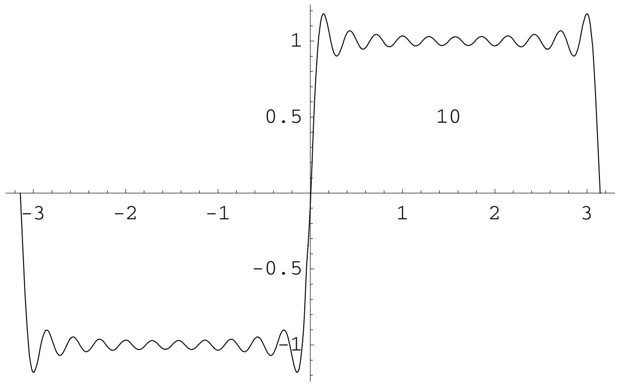
-0.5
-1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-2
-1
1
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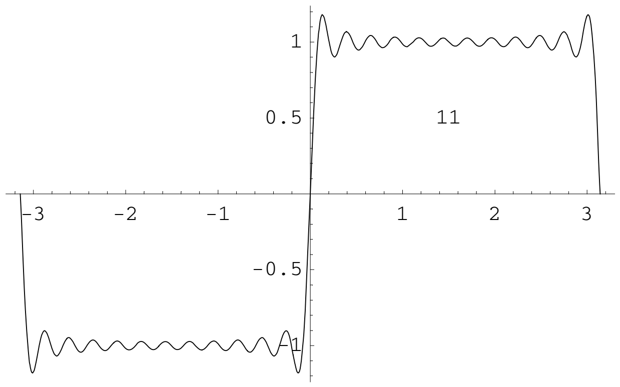
3
-0.5
-1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11
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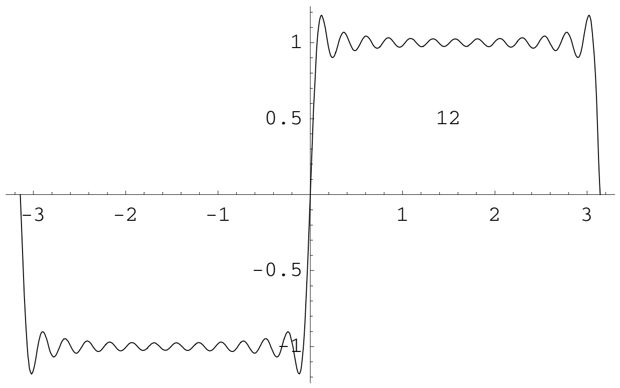
-2
-1
1
2
3
-0.5
-1


1
0.5
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-3
-2
-1
1
2
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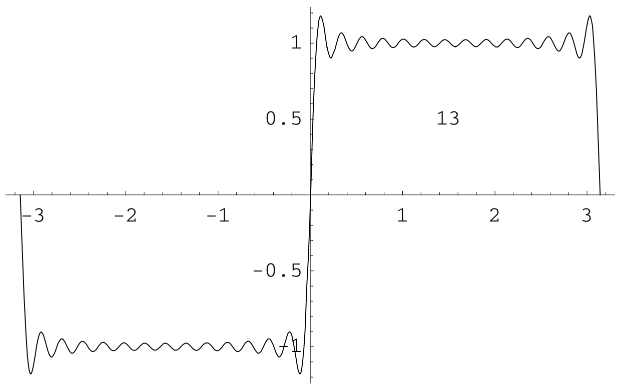
-0.5
-1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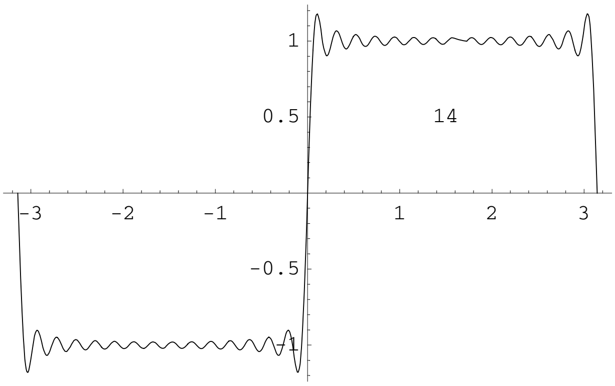
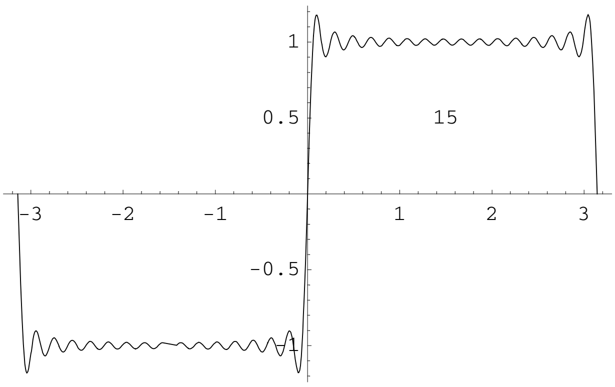
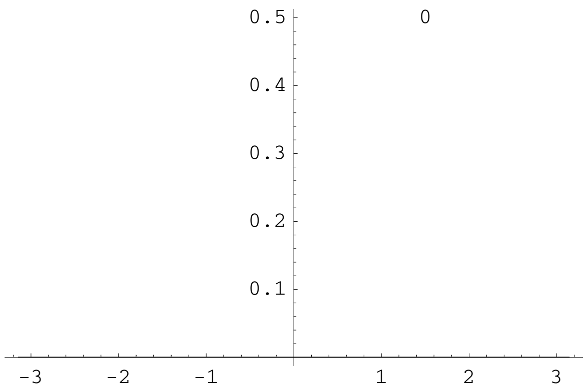
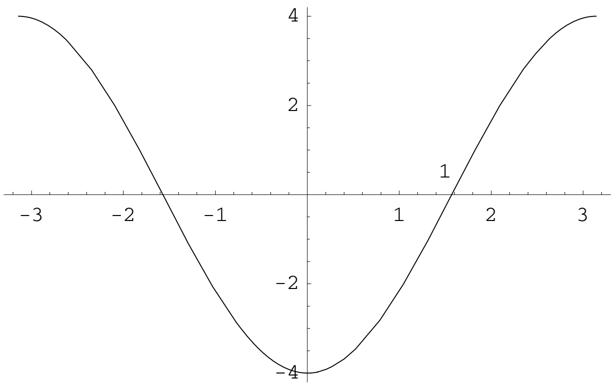
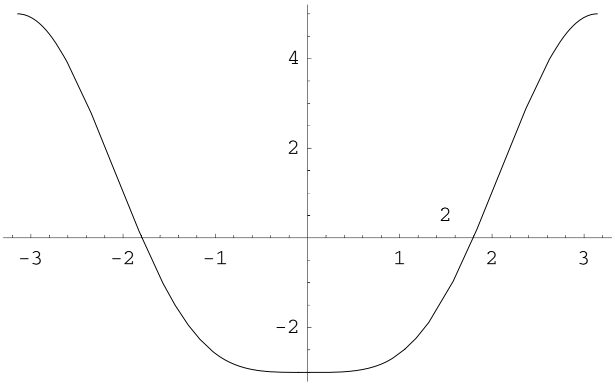





```
(*x^2 függvény első 10 Fourier polinomja *)
<< Graphics`Animation`
j = Table[{Show[Plot[∑_{k=1}^{i} ((4 (-1)^k)/(k^2) Cos[k x]), {x, -π, π}, DisplayFunction → Identity]],
    Graphics[Text[i, {1.5, 0.5}]]}, {i, 0, 10}];
ShowAnimation[j, DisplayFunction → $DisplayFunction];
```



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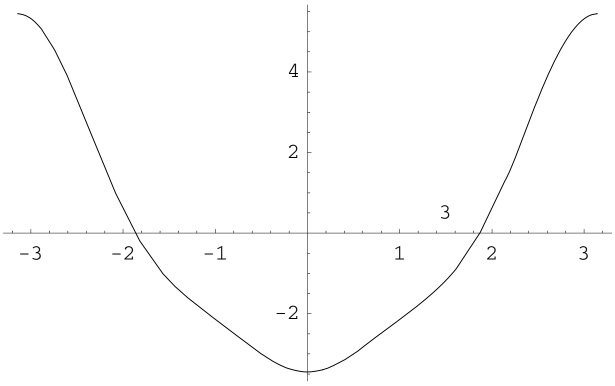
2
-3
-2
-1
1
2
3
-2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-3
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1
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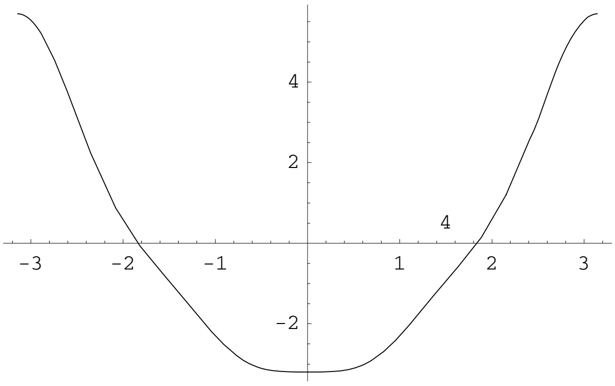
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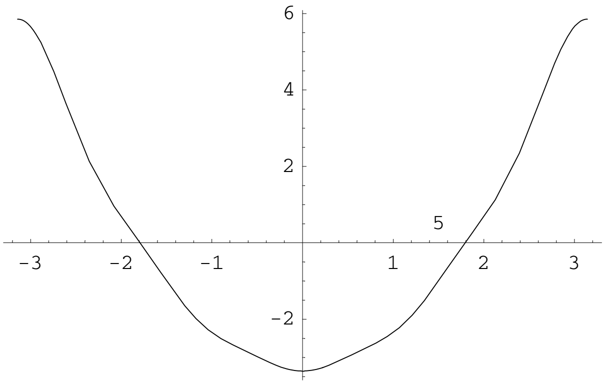
6
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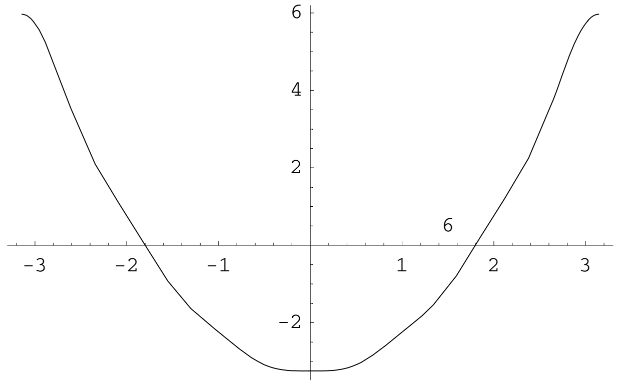
2
5
-3
-2
-1
1
2
3
-2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-3
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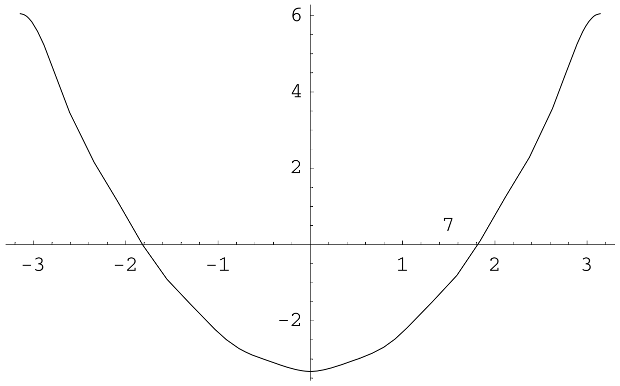
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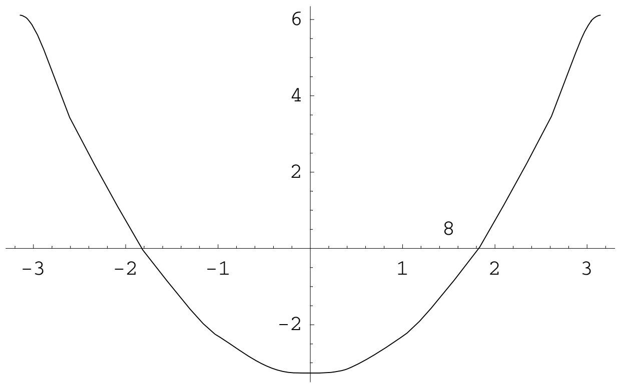
-2


8
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-3
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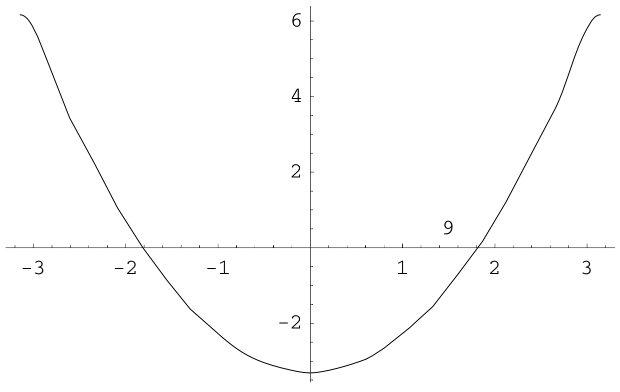
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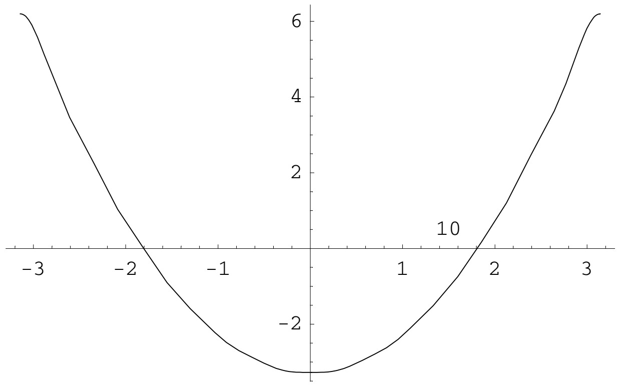
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