

### Classwork 24.



Functions can be even, odd, or not even not odd.

We call function an even function if for all possible  $x$

$$f(x) = F(-x)$$

The function  $y = x^2$  is an even function.

We call function an odd function. Is for any possible  $x$

$$f(x) = -f(-x)$$

### Completing the full square.

Polynomial of a second degree can be represented as

$$ax^2 + bx + c$$

where  $a$ ,  $b$  and  $c$  are numbers (can be positive or negative), and  $x$  is a variable.

We already know that the square of the sum:

$$(m + n)^2 = m^2 + 2mn + n^2$$

The formula for polynomial of the second degree looks similar to the sum of the square.

First, let's to factor out  $a$  from first two terms of expression. By doing this we will not change the value of the expression.

$$a \cdot \left( x^2 + \frac{b}{a}x \right) + c$$

For the next step we will rewrite the expression as

$$a \cdot \left( x^2 + 2 \cdot \frac{1}{2} \frac{b}{a}x + \left( \frac{b}{2a} \right)^2 - \left( \frac{b}{2a} \right)^2 \right) + c$$

Here I added and subtracted the square of the half of the  $\frac{b}{a}$ . Now the first three terms of the polynomial look like a square of the sum:

$$a \cdot \left( \left( x + \frac{b}{2a} \right)^2 - \left( \frac{b}{2a} \right)^2 \right) + c = a \cdot \left( x + \frac{b}{2a} \right)^2 - a \left( \frac{b}{2a} \right)^2 + c$$

And finally

$$a \cdot \left( x + \frac{b}{2a} \right)^2 - a \frac{b^2}{4a^2} + c = a \cdot \left( x + \frac{b}{2a} \right)^2 + \left( c - \frac{b^2}{4a} \right)$$

Let study the quadratic function.

Plot functions:

a.  $f(x) = x^2$ ;  $y = 5x^2$ ;  $g(x) = 0.5x^2$ ;  $y = -2x^2$ ;

b.  $f(x) = x^2 + 5$ ;  $y = 5x^2 - 5$ ;  $g(x) = -0.5x^2 + 5$ ;

c.  $f(x) = (x + 2)^2$ ;  $y = (5x - 2)^2$ ;  $g(x) = (-0.5x - 5)^2$ ;

Exercises:

1. Add a term to the binomial so that the resulting trinomial becomes a perfect square.

a.  $x^2 + 2x$ ;

b.  $a^2 + 4ab$ ;

c.  $m^2 + 1$ ;

d.  $9 + 6l$ ;

e.  $10y + 25$ ;

f.  $16x^2 + 8xy$ ;

2. Complete the full squares:

a.  $a^2 + 2x + 2$ ;

b.  $x^2 - 2x + 3$ ;

c.  $m^2 - 2m - 1$ ;

d.  $4 + 2q + q^2$ ;

e.  $x^2 + 6x + 1$ ;

f.  $a^2 - 4a + 1$ ;

g.  $m^2 - 6m + 9$ ;

h.  $16 - 8p + p^2$ ;

i.  $a^2 - 2a$ ;

3. Write closed intervals, open intervals, half-open/half closed intervals:

