Functions

Exercises

1.
Given the function

$$f(x) = x^2 + 6x - 4,$$

verify the equalities

1) $f(1) = 3,$
2) $f(3) = 23.$

2.
Let

$$f(x) = x^2 + 1.$$

Evaluate

1) $f(4),$ 2) $f(\sqrt{2}),$ 3) $f(a+1),$ 4) $f(a)+1,$ 5) $f(a^2),$ 6) $[f(a)]^2,$ 7) $f(2a).$

3.
Let

$$\varphi(x) = \frac{x-1}{3x+5}, \qquad x \neq -\frac{5}{3}.$$

Write the expressions

1. $\varphi\left(\frac{1}{x}\right)$
2. $\frac{1}{\varphi(x)}$

4.
Let

$$\psi(x) = \sqrt{x^2 + 4}. \qquad .$$

Write the expressions

1. $\varphi(2x)$
2. $\varphi(0).$

5.
Let

$$f(\theta) = \tan\theta$$

Verify the equality

$$f(2\theta) = \frac{2f(\theta)}{1-[f(\theta)]^2}.$$

6.
Let

$$\varphi(x) = \log\frac{1-x}{1+x}.$$

Verify the equality

$$.\ \varphi(a)+\varphi(b) = \varphi\left(\frac{a+b}{1+ab}\right)$$

7.
Let

$$f_1:\quad y = \frac{(x^2-2x-3)(x+2)}{(x+1)(x-3)},\quad x \in \left]a_1,\ +\infty\right[.$$
$$f_2:\quad y = x+2,\quad x \in \left]a_2,\ +\infty\right[$$

For which values of a_1 and a_2 are the two functions f_1 and f_2 equal?

(To be continued.)