

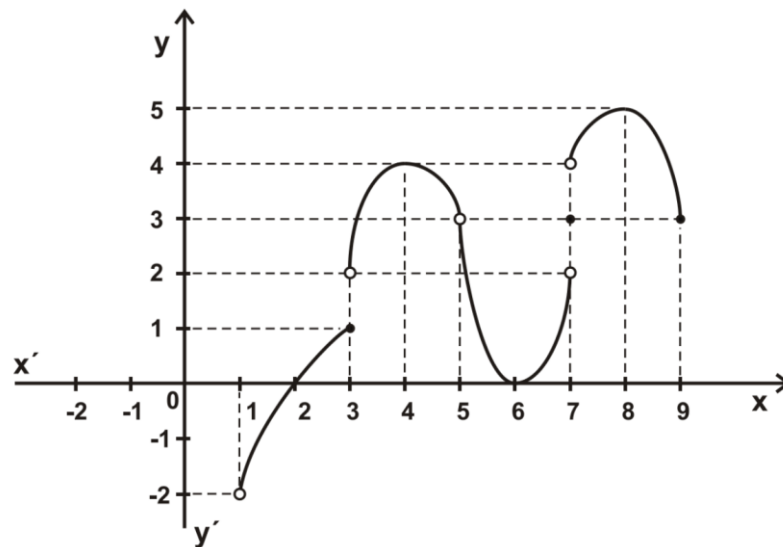
Quiz 2 (Tasks from Greece)

1. Let be the function: $f(x) = x^3 + 3x^2 - 9x + 7$.
Find and explain how many roots (zero points) the function has.
(2 points)

2. Let be the function: $f(x) = 2 - \sqrt{x-1}$.
 - i. Find the domain of definition and the range of the function f .
 - ii. Draw the graph of the function f with appropriate transfer of the graph of the function $y = \sqrt{x}$ and describe the steps.(2 points)

3. Solve the equation: $2x + 1 = \cos x$
(2 points)

4. Answer the following questions according to the graph of the function f , which is given below.



- i. Find the domain of definition and the range of the function f .
- ii. Find the following limits or if they do not exist, explain why.

$$\lim_{x \rightarrow 1} f(x)$$

$$\lim_{x \rightarrow 3} f(x)$$

$$\lim_{x \rightarrow 5} f(x)$$

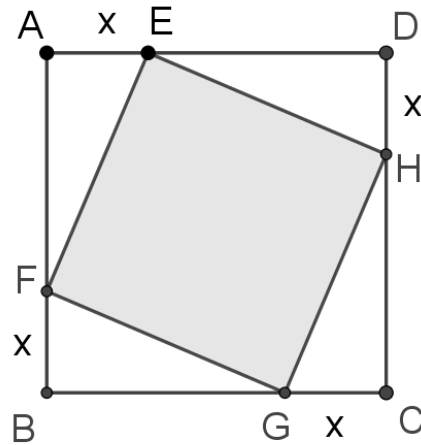
$$\lim_{x \rightarrow 7} f(x)$$

$$\lim_{x \rightarrow 2} \frac{1}{f(x)}$$

$$\lim_{x \rightarrow 6} \frac{1}{f(x)}$$

(5 points)

5. ABCD and EFGH are squares and E, F, G, H are moving along the sides of the ABCD square as shown in the shape below. Each side of ABCD is 2cm. Suppose that $AE=BF=CG=DH=x$, and $0 \leq x \leq 2$.
(i.e. $x \in [0, 2]$ and the symbol $[0, 2]$ represent a closed interval)



After you prove that the area of the EFGH square is given from the function $f(x) = 2x^2 - 4x + 4$, find the values of x that maximize and minimize this area.

(5 points)