Imię i nazwisko:
Klasa:
Grupa 1
Wynik:

Question 1 ***(1 pt)***
If $f(x) = ax^2 + a$ and $f(1) = 4$, then

A. $a = 1$ B. $a = 2$ C. $a = 4$ D. $a = 14$

Question 2 ***(1 pt)***
The function $f(x) = \dfrac{5 - 3^x}{\log_2(x+2)}$ intersects the y-axis at the point

A. $(1, 0)$ B. $(0, 2)$ C. $(0, 4)$ D. $(0, 14)$

Question 3 ***(1 pt)***
How many zeros does the function $f(x) = \begin{cases} x - 4 & if\ x \in (-\infty, 0) \\ x^2 + 3 & if\ x \in \langle 0, \infty) \end{cases}$ have?

A. 0 B. 1 C. 2 D. 3

Question 4 ***(1 pt)***
Which of the following functions is odd?

A. $f(x) = x^2 + x$ B. $f(x) = x^3 + x$ C. $f(x) = x^3 + x^2$ D. $f(x) = x^2 + 1$

Question 5 ***(1 pt)***
What is the range of the function $f(x) = \frac{3}{2x+1}$, where $x \in \langle 1, 4\rangle$.

A. $\langle 1, 3\rangle$ B. $\langle 3, 9\rangle$ C. $\langle \frac{1}{3}, 1\rangle$ D. $\langle 0, \infty)$

Question 6 ***(3 pts)***

Find the domain and zeros of the function $f(x) = \dfrac{\big||x-3|-2\big|-1}{x^2-4x+4}$.

Question 7 ***(3 pts)***

Consider the function $f(x) = \dfrac{4}{x^2+1}$.

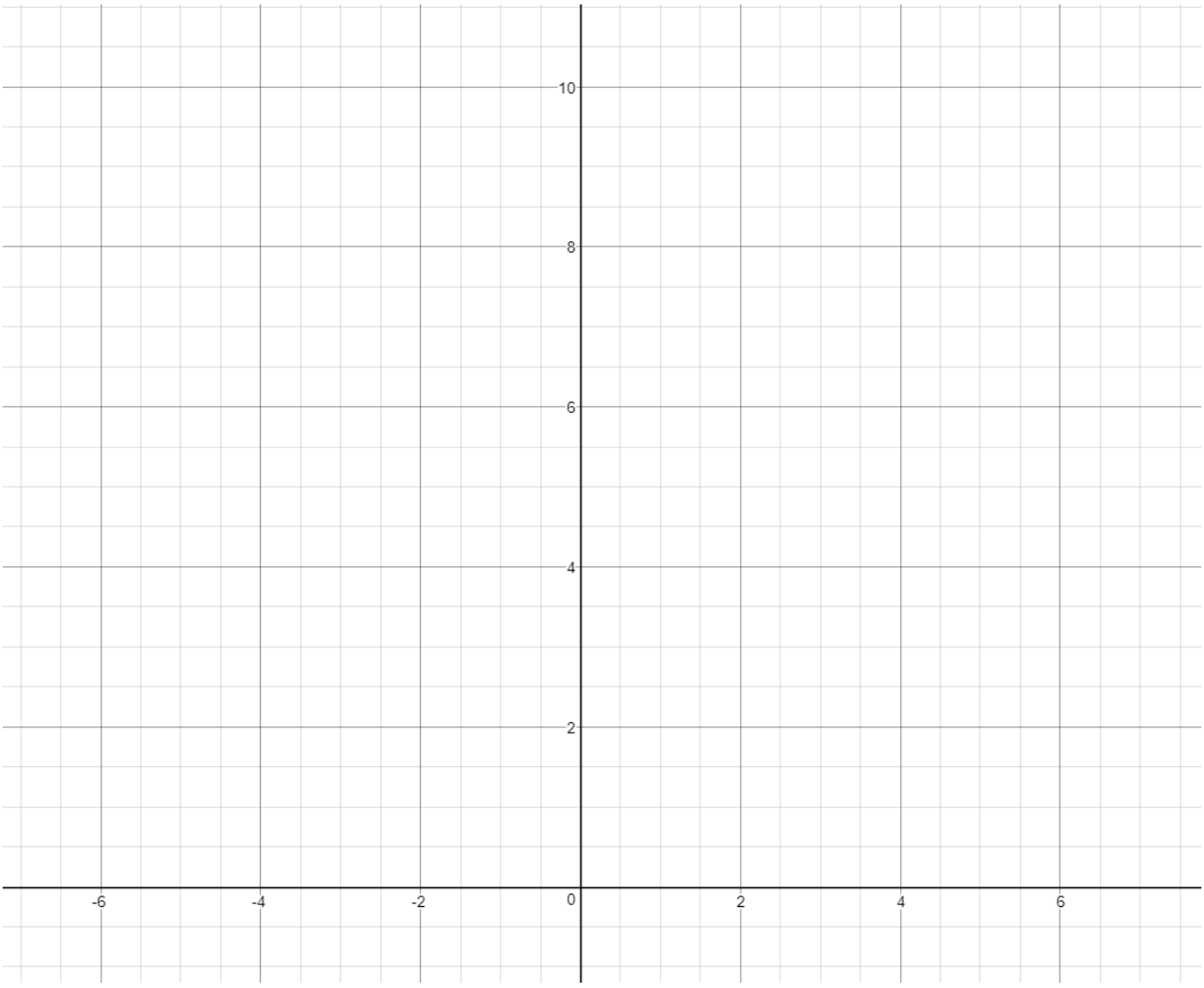
(a) Show that f is an even function.

(b) Show that f is decreasing for $x \in \langle 0, \infty)$.

(c) Find the range of f.

Question 8 ***(3 pts)***

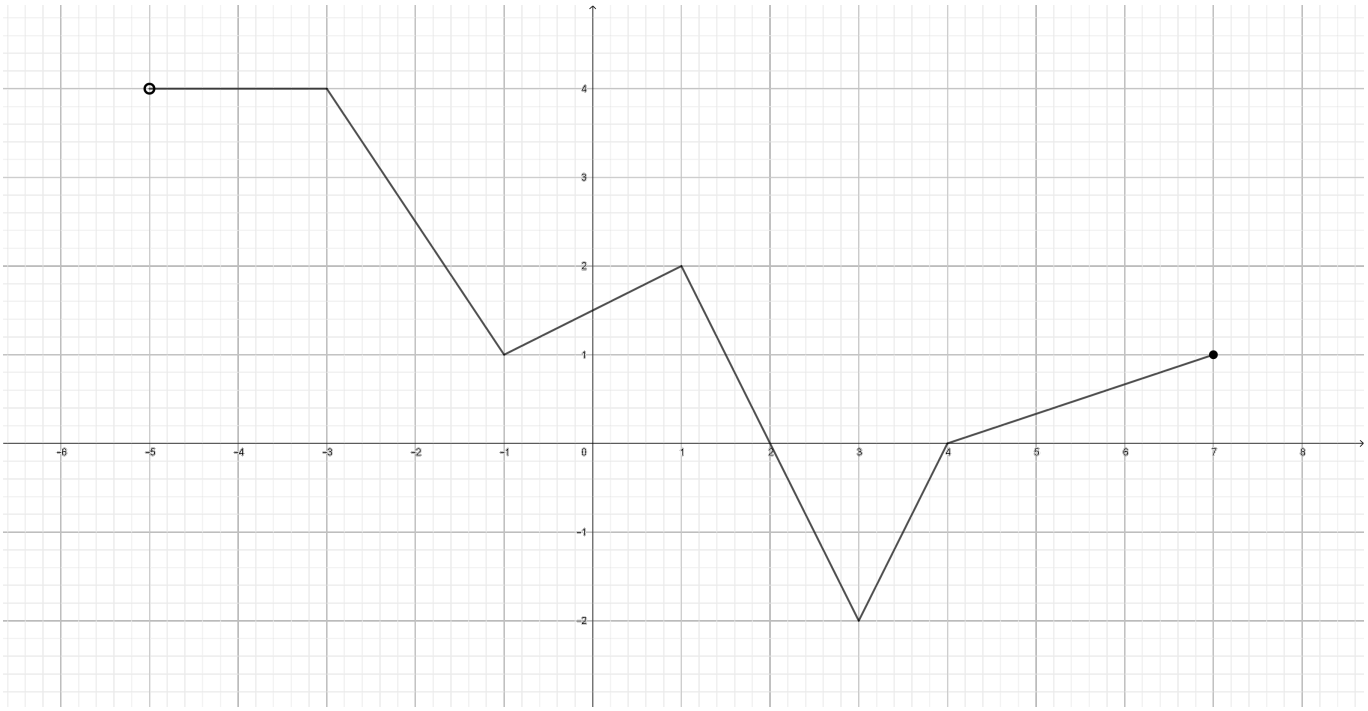
Use the axes below to sketch the graphs of $f(x) = x^2$ and $g(x) = 2x + 3$.



Hence solve $x^2 = 2x + 3$.

Question 9 ***(6 pts)***

The diagram shows the graph of a function f.



(a) Write down:

i. the domain of f,

ii. the range of f,

iii. the zeros of f,

iv. the set of values of x for which the function is negative,

v. the intervals where the function is increasing.

(b) Solve $f(x) \geqslant 2$.

Extra question

Show that the function $f(x) = x^3 - 3x$ is decreasing for $x \in \langle 0, 1\rangle$ and increasing for $x \in \langle 1, \infty)$. Show also that f is odd and hence state all the intervals where the function is decreasing and intervals where the function is increasing.