In-class Activity 3
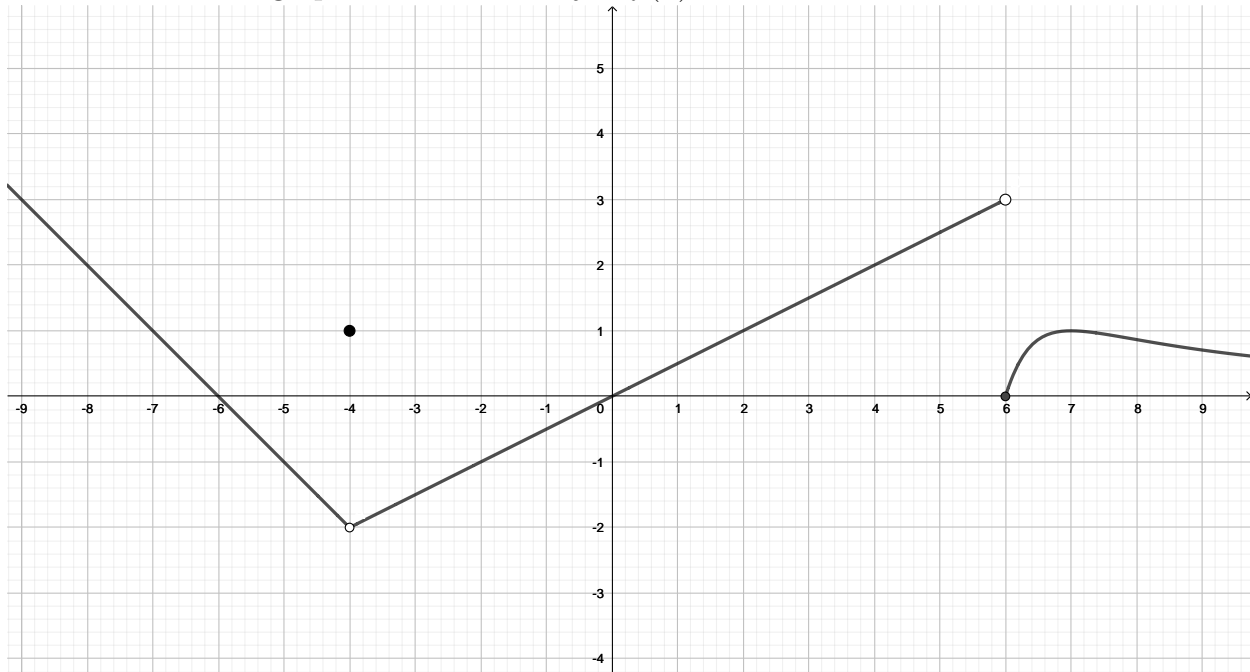
LAST NAME: _____ FIRST NAME: _____

Question 1

Given below is the graph of the function $y = f(x)$.

Find all the points where f is discontinuous specifying the type of discontinuity (justify properly).

Question 2

Find all the points where the following functions are discontinuous, specifying the type of discontinuity (justify properly):

1) $f(x) = \cos(x^2 - 10) - 5$

$$2)\ g(x) = \begin{cases} 3 & \text{if } x \leq -2 \\ \frac{x^3-x+1}{x+2} & \text{if } -2 < x < 1 \\ \frac{3}{9x} & \text{if } x \geq 1, \end{cases}$$

Question 3 Find the value of the parameter a that makes the following function continuous on $]-\infty, +\infty[$:

$$f(x) = \begin{cases} ax^2 - 10 & \text{if } x < -2 \\ \frac{a}{x+5} & \text{if } x \geq -2 \end{cases}$$

Question 4 Find the values of the parameters a and b that make the following function continuous on $]-\infty, +\infty[$:

$$f(x) = \begin{cases} ax^2 + b & \text{for} \quad x < -1 \\ b + 4 & \text{for} \quad x = -1 \\ \cos(\pi x) + a & \text{for} \quad x > -1 \end{cases}$$

Question 5 1) Prove that the equation $x^7 = 2x^6 + 3x^2 - 5$ has at least one real solution in the interval $[-1, 0]$.

2) Does the equation $\sin(x) + x^2 = 1$ have any real solutions?