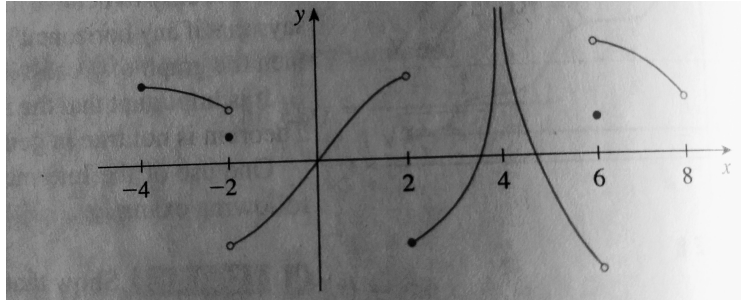


Week 8 – Worksheet – MTH 305 (Spring 2017)

- (1) From the graph of g , state the intervals on which g is continuous.



- (2) Where are each of the following functions discontinuous?

(a) $f(x) = \frac{x^2 - x - 12}{x - 4}$

(b) $f(x) = \begin{cases} \frac{1}{x^2} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$

(c) $f(x) = \begin{cases} \frac{x^2 - x - 12}{x - 4} & \text{if } x \neq 4 \\ 1 & \text{if } x = 4 \end{cases}$

(d) $f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ 2x^2 & \text{if } 0 \leq x \leq 1 \\ 2 - x & \text{if } x > 1 \end{cases}$

At which of these numbers is f continuous from the right, from the left, or neither. Sketch the graph of f .

- (3) The toll T charged for driving on a certain stretch of a toll road is \$ 5 except during rush hours (between 7 AM and 10 AM and between 4 PM and 7 PM) when the toll is \$ 7.

- (a) Sketch a graph of T as a function of the time t , measured in hours past midnight.
 (b) Discuss the discontinuities of this function and their significance to someone who uses the road.

- (4) Consider the function

$$f(x) = \begin{cases} \frac{x^2 + 4x - 5}{x - 1} & \text{if } x \neq 1 \\ a & \text{if } x = 1 \end{cases}$$

Find the value of a so that f is continuous everywhere.

- (5) Find the values of A and B so that the following function is continuous for all values of x

$$f(x) = \begin{cases} Ax - B & \text{if } x \leq -1 \\ 2x^2 + 3Ax + B & \text{if } -1 < x \leq 1 \\ 4 & \text{if } x > 1 \end{cases}$$

- (6) Use the intermediate value theorem to show that there is a root of the equation $x^4 + x - 3 = 0$ between 1 and 2.

- (7) Show that the function $f(x) = 1 - \sqrt{4 - x^2}$ is continuous on the interval $[-2, 2]$.