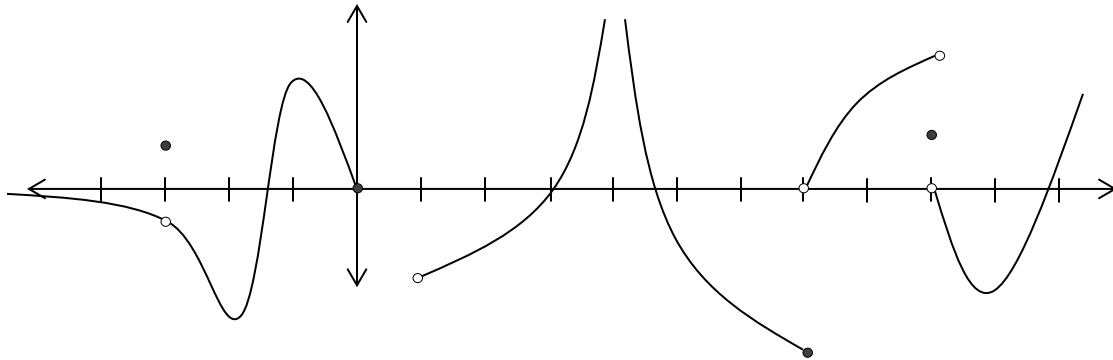


Homework Set 13

1.5: Continuity

1. On what intervals is the function f , shown below, continuous?



For questions 2 and 3, find where the given function is continuous.

2. $f(x) = \frac{x}{x^2+5x+6}$

3. $g(x) = x^2 + \sqrt{2x-1}$

4. Find the numbers at which the function f is discontinuous. At which of these points is the function f continuous from the right, from the left, or neither?

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

5. Is the given function discontinuous at a ? Why or why not? If it is discontinuous, what type of discontinuity is at $x = a$?

a. $f(x) = \frac{1}{x+2}$ $a = -2$

b. $g(x) = \begin{cases} \frac{1}{x+2} & , \text{ if } x \neq -2 \\ 1 & , \text{ if } x = -2 \end{cases}$ $a = -2$

c. $h(t) = \begin{cases} e^t & , \text{ if } t < 0 \\ t^2 & , \text{ if } t \geq 0 \end{cases}$ $a = 0$

d. $p(t) = \begin{cases} \frac{t^2-1}{t^2-t} & , \text{ if } t \neq 1 \\ 2 & , \text{ if } t = 1 \end{cases}$ $a = 1$

6. Find the values of a and b that make f continuous everywhere.

$$f(x) = \begin{cases} \frac{x^2 - 4}{x - 2} & \text{if } x < 2 \\ ax^2 - bx + 3 & \text{if } 2 \leq x < 3 \\ 2x - a + b & \text{if } x \geq 3 \end{cases}$$

For questions 7 and 8, use continuity to calculate the limits.

7.

$$\lim_{x \rightarrow \pi} \sin(x + \sin x)$$

8.

$$\lim_{x \rightarrow 2} \arctan\left(\frac{x^2 - 4}{3x^2 - 6x}\right)$$

For questions 9 and 10, use the Intermediate Value Theorem to show that there is a root of the equation in the given interval.

9. $x^4 + x - 3 = 0$ on $(1,2)$

10. $\sin x = x^2 - x$ on $(1,2)$