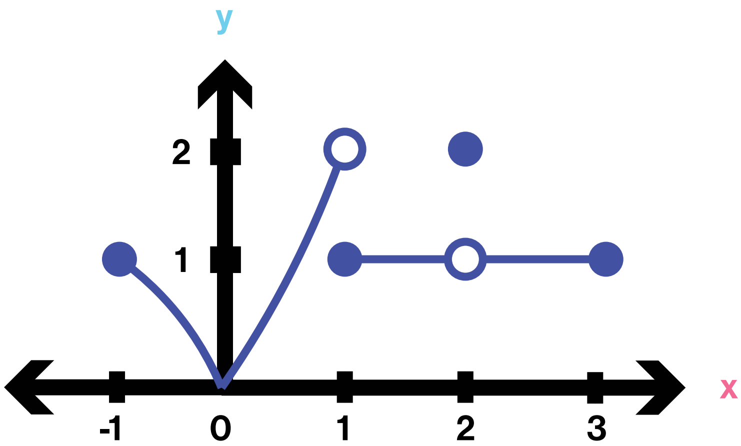
Continuity Practice

Name: ______________________ Date: ______________________

Question 1

Solve

I.



Nonremovable

Removable

Question 2

Determine the points at which the function is discontinuous

I. $y = \tan \frac{\pi x}{2}$

II. $y = \frac{x+3}{x^2 - 3x - 10}$

III. $y = \sqrt{2x+3}$

IV. $y = (2-x)^{1/5}$

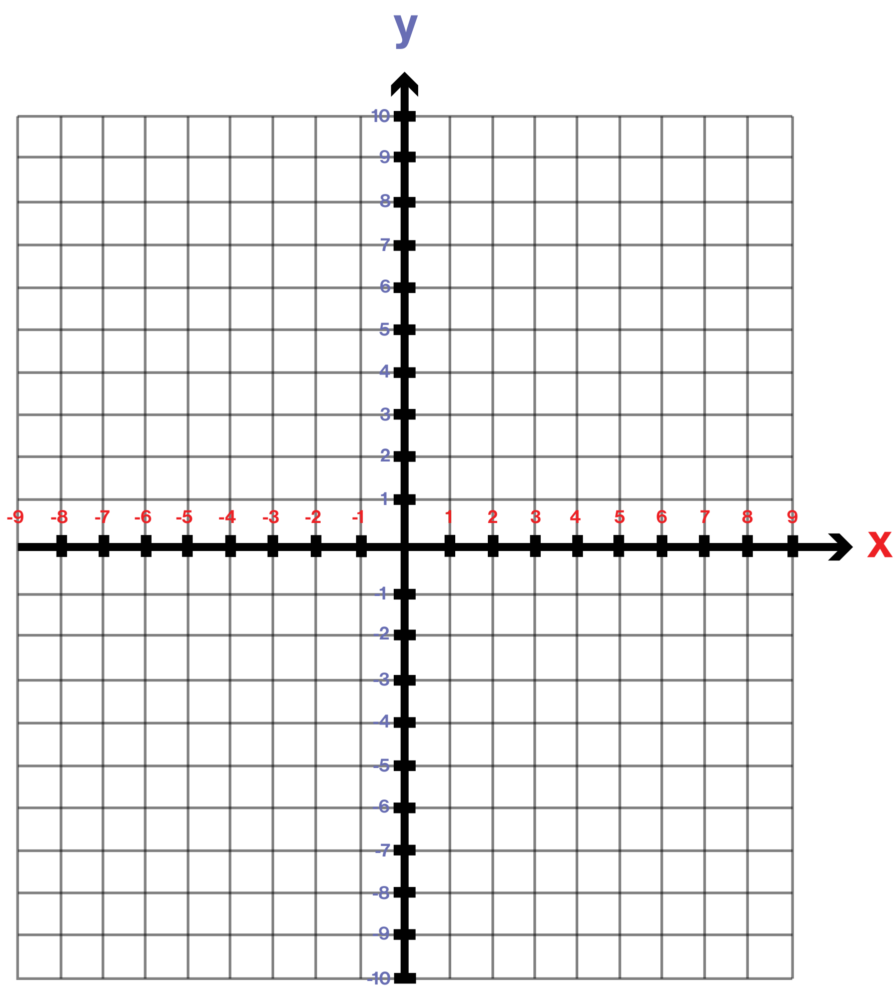
V. $f(x) = \frac{x+3}{2 - e^x}$

Continuity Practice

Question 3

Determine the points at which the function is discontinuous

I. $f(x) = \begin{cases} 1 - x & x < 0 \\ e^x & 0 \le x \le 1 \\ x^2 + 2 & x > 1 \end{cases}$



Continuity Practice

Question 4

Find the limit and determine if the function is continuous at the point being approached

I. $\lim_{x \to 0} \sin\left(\frac{\pi}{2} \cos(\tan x)\right)$

II. $\lim_{x \to 0^+} \sin\left(\frac{\pi}{2} e^{\sqrt{x}}\right)$

Question 5

Define f(1) in a way that extends $f(x) = \frac{x^3 - 1}{x^2 - 1}$ to be continuous at x = 1

I. $f(x) = \frac{x^3 - 1}{x^2 - 1}$

Question 6

Determine the value of a that is continuous at every x

I. $f(x) = \begin{cases} \frac{x - a}{a + 1} & x \leq 0 \\ x^2 + a & x > 0 \end{cases}$

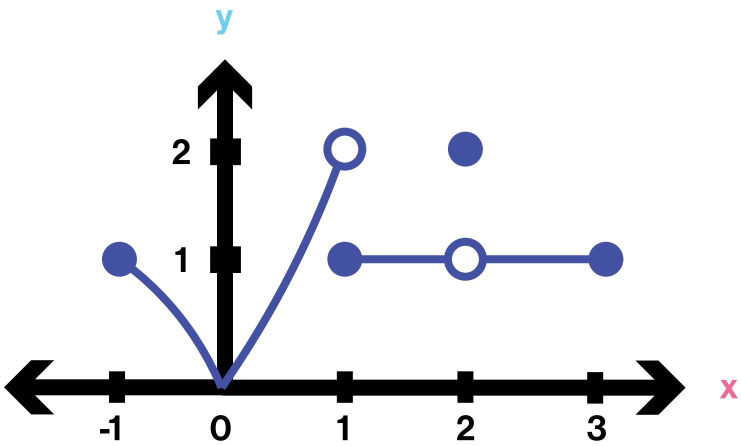
Continuity Practice

Name: Key Date: ____________

Question 1

Solve

I.



Nonremovable

$x = 1$

$\lim_{x \to 1} f(x)$ does not exist

$\lim_{x \to 1^-} f(x) = 2 \neq \lim_{x \to 1^+} f(x) = 1$

Removable

$x = 2$

Assign the number $\lim_{x \to 2} f(x) = 1$ to be the value of $f(2)$ rather than $f(2) = 2$

Question 2

Determine the points at which the function is discontinuous

I. $y = \tan \frac{\pi x}{2}$

Discontinuous when $\frac{\pi x}{2}$ is an odd integer multiple of $\frac{\pi}{2}$

$\frac{\pi x}{2} = (2n - 1)\frac{\pi}{2} \longrightarrow x = 2n - 1$

II. $y = \frac{x + 3}{x^2 - 3x - 10}$

$x^2 - 3x - 10 \longrightarrow (x - 5)(x + 2) \longrightarrow \begin{matrix} x - 5 = 0 \\ x + 2 = 0 \end{matrix} \longrightarrow \begin{matrix} x = 5 \\ x = -2 \end{matrix}$

Discontinuous when $x = 5$ OR $x = -2$

III. $y = \sqrt{2x + 3}$

Discontinuous when

$2x + 3 < 0$ OR $x < -3/2$

IV. $y = (2 - x)^{1/5}$

Continuous

V. $f(x) = \frac{x + 3}{2 - e^x}$

Discontinuous when $x = \ln 2$

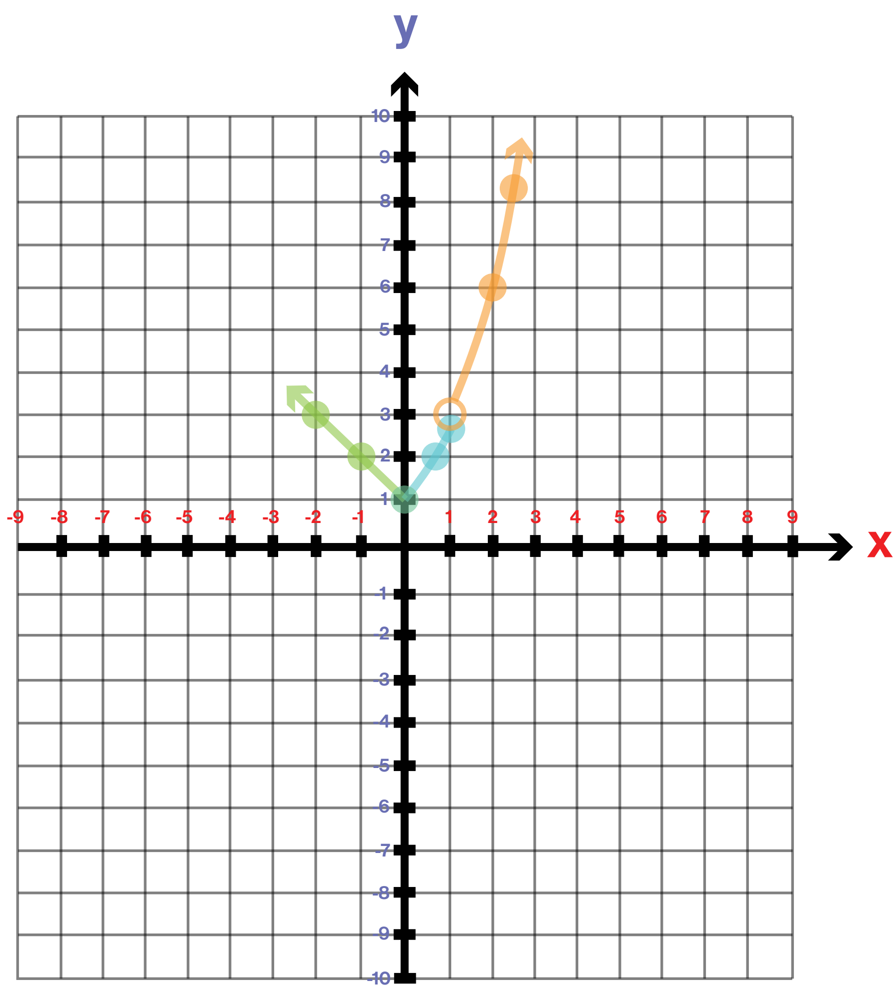
$2 - e^x = 0 \longrightarrow -e^x = -2 \longrightarrow e^x = 2 \longrightarrow x = \ln 2$

Continuity Practice

Question 3

Determine the points at which the function is discontinuous

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



Discontinuous when $x = 1$

Continuity Practice

Question 4

Find the limit and determine if the function is continuous at the point being approached

I. $\lim_{x \to 0} \sin\left(\frac{\pi}{2} \cos(\tan x)\right) \to \sin\left(\frac{\pi}{2} \cos(\tan(0))\right) \to 1$

Continuous at $x = 0$ (check by graphing)

II. $\lim_{x \to 0^+} \sin\left(\frac{\pi}{2} e^{\sqrt{x}}\right) \to \sin\left(\frac{\pi}{2} e^{\sqrt{0}}\right) \to 1$

Continuous at $x = 0$ (check by graphing)

Question 5

Define f(1) in a way that extends $f(x) = \frac{x^3 - 1}{x^2 - 1}$ to be continuous at $x = 1$

I. $f(x) = \frac{x^3 - 1}{x^2 - 1} \to \frac{(x-1)(x^2 + x + 1)}{(x-1)(x+1)}$ $x \neq 1 \to f(1) = \lim_{x \to 1} \left(\frac{x^2 + x + 1}{x + 1}\right) \to \frac{(1)^2 + (1) + 1}{(1) + 1} \to \frac{3}{2}$

Question 6

Determine the value of a that is continuous at every x

I. $f(x) = \begin{cases} \frac{x - a}{a + 1} & x \leq 0 \\ x^2 + a & x > 0 \end{cases}$

$\lim_{x \to 0^-} f(x) = \frac{x - a}{a + 1} \to \frac{(0) - a}{a + 1} \to \frac{-a}{a + 1}$

$\lim_{x \to 0^+} f(x) = x^2 + a \to (0)^2 + a \to a$

$\frac{-a}{a + 1} = a \to a = 0 \text{ OR } -2$