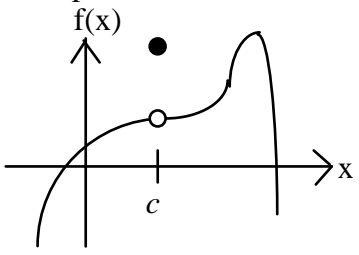
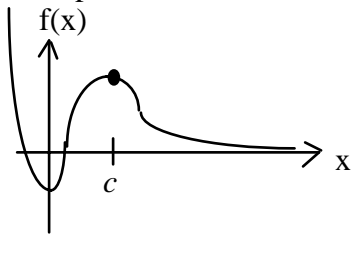
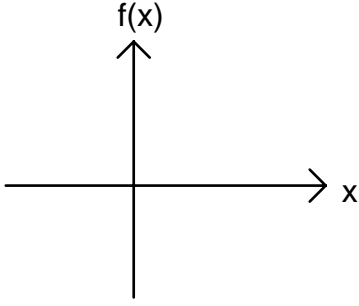
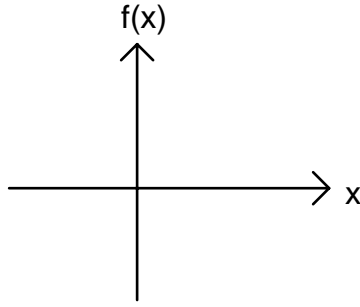
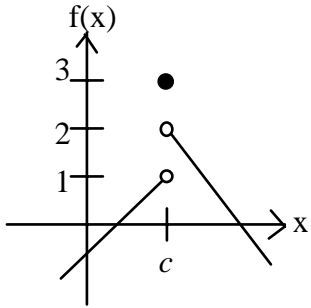
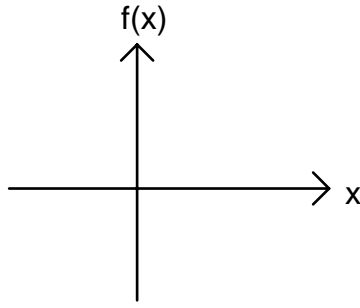


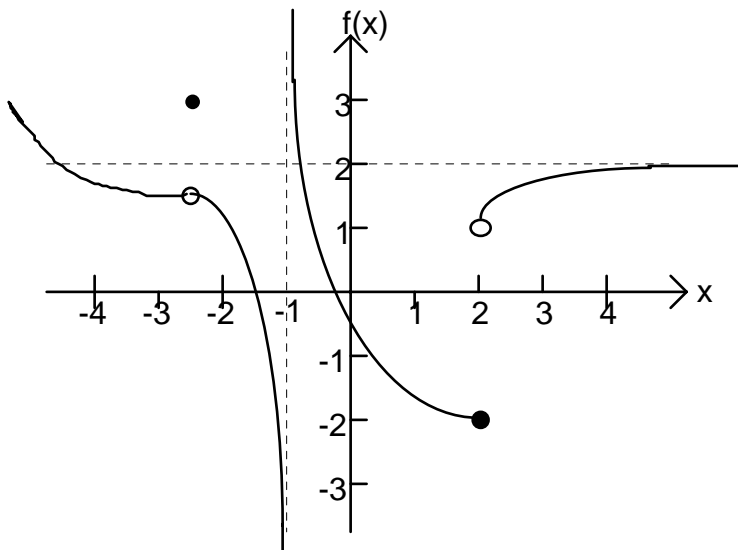
Continuity

Lecture examples

<p>example 1</p> 	<p>example 2</p> 
<p>example 3</p> $f(x) = \begin{cases} x^2 + x & \text{when } x \neq 0 \\ 0 & \text{when } x = 0 \end{cases}$ 	<p>example 4 $f(x) = \frac{1}{x}$</p> 
<p>example 5</p> 	<p>example 6</p> $f(x) = \begin{cases} 2x^2 & \text{when } x > 1 \\ 2x - 1 & \text{when } x \leq 1 \end{cases}$ 

In class problems:

1.) Use the picture of $f(x)$ below to fill in the blanks. (Use ∞ or $-\infty$ where appropriate. Use d.n.e. for does not exist.)



(a.) $f(-2.5) = \underline{\hspace{2cm}}$

(b.) $f(-1) = \underline{\hspace{2cm}}$

(c.) $f(0) = \underline{\hspace{2cm}}$

(d.) $f(2) = \underline{\hspace{2cm}}$

(e.) $\lim_{x \rightarrow -2.5} f(x) = \underline{\hspace{2cm}}$ (f.) $\lim_{x \rightarrow 0} f(x) = \underline{\hspace{2cm}}$

(g.) $\lim_{x \rightarrow -1^-} f(x) = \underline{\hspace{2cm}}$ (h.) $\lim_{x \rightarrow 2} f(x) = \underline{\hspace{2cm}}$

(i.) $\lim_{x \rightarrow -\infty} f(x) = \underline{\hspace{2cm}}$ (j.) $\lim_{x \rightarrow \infty} f(x) = \underline{\hspace{2cm}}$

(k.) For which values of x is $f(x)$ discontinuous? $\underline{\hspace{4cm}}$

2.) Evaluate the following limits: (Use ∞ or $-\infty$ where appropriate. Use d.n.e. for does not exist.)

(a.) $\lim_{x \rightarrow -\infty} \frac{5x^3 + 3x - 2}{-4x^3 + 2x}$ (Hint: use what you learned in Math 121 about end behavior of rational functions.)

(b.) $\lim_{x \rightarrow 3} \frac{7}{x - 3}$

(c.) $\lim_{x \rightarrow 2} \frac{1}{(x-2)^2}$

(d.) $\lim_{x \rightarrow -3} \sqrt{x^2 + 5}$

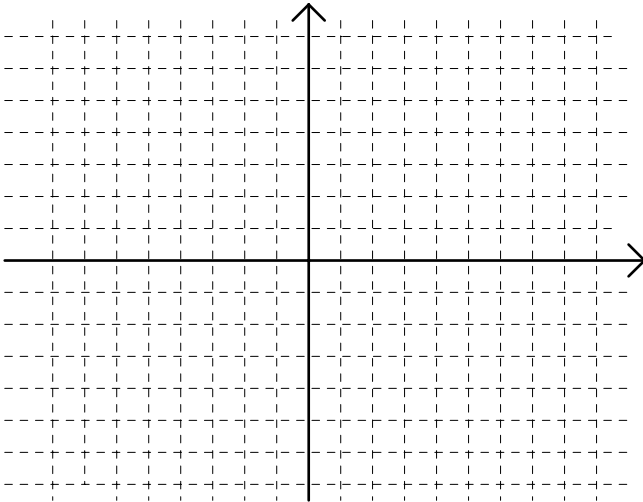
(e.) $\lim_{x \rightarrow -2} \frac{4x^2 - 16}{x + 2}$

3.) Fill in the blank to make $g(x)$ continuous at $x = -2$.

$$g(x) = \begin{cases} \frac{4x^2 - 16}{x + 2} & \text{when } x \neq -2 \\ \underline{\hspace{2cm}} & \text{when } x = -2 \end{cases}$$

4.) Draw a rough graph and name all x-values where $f(x)$ is continuous.

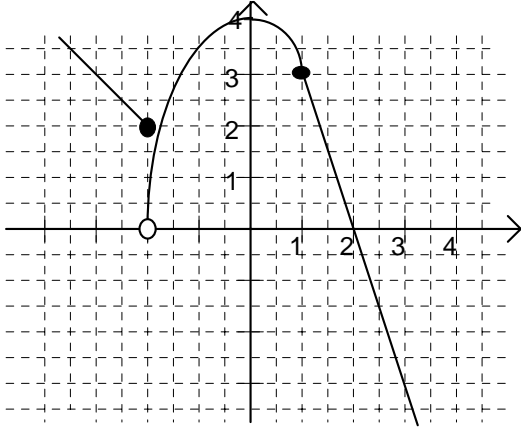
$$f(x) = \begin{cases} -x & \text{when } x \leq -2 \\ -x^2 + 4 & \text{when } -2 < x \leq 1 \\ -3x + 6 & \text{when } x > 1 \end{cases}$$



State the intervals where f is continuous :

Answers:

- 1.) a.) 3, b.) d.n.e., c.) -5, d.) -2, e.) 1.5
f.) -5, g.) $-\infty$, h.) d.n.e, i.) ∞ , j.) 2
k.) -2.5, -1, 2
- 2.) a.) -5/4, b.) d.n.e., c.) ∞ , d.) 2, e.) -16
- 3.) -16
- 4.)



f is continuous on $(-\infty, -2) \cup (-2, \infty)$