Calculus Workshop

Limits and Derivatives Problem Set

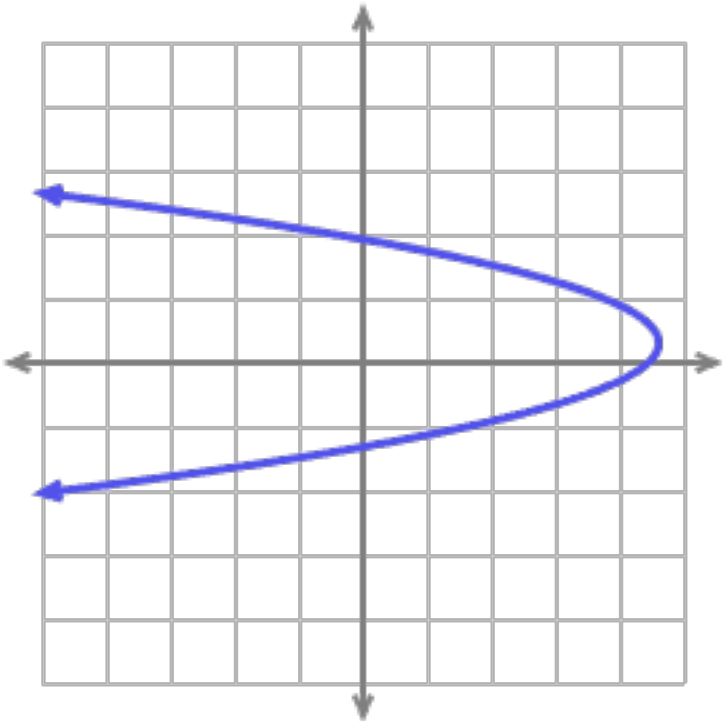
Nathan Grimes

2023-09-19

Answer the following questions to the best of your ability. Feel free to work with anyone in the cohort, though I would encourage attempting on your own first to make sure you fully understand the concepts.

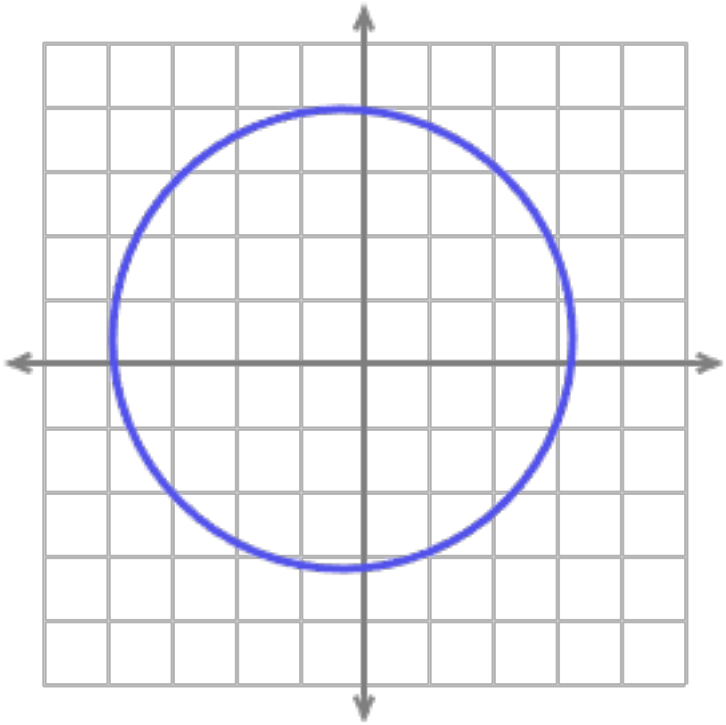
1) Which of these graphs depict functions and which do not?

A)

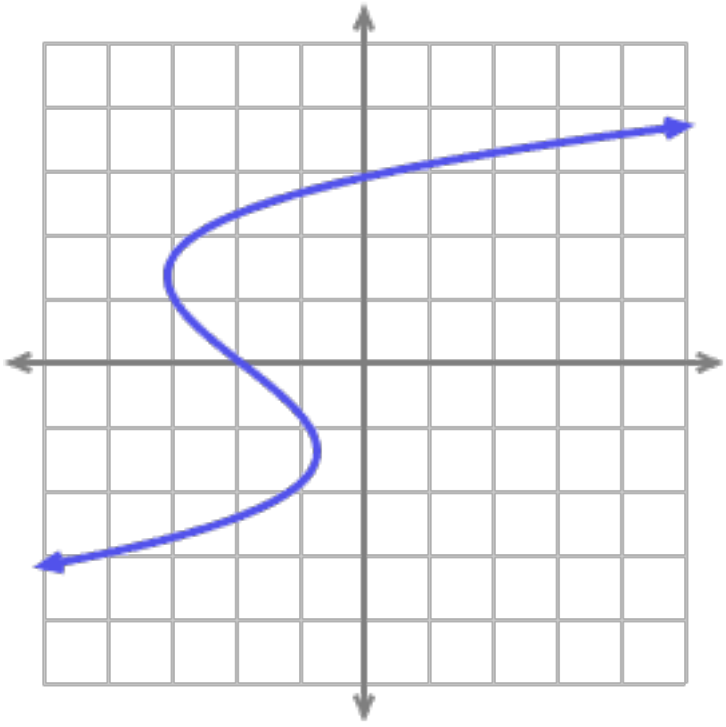


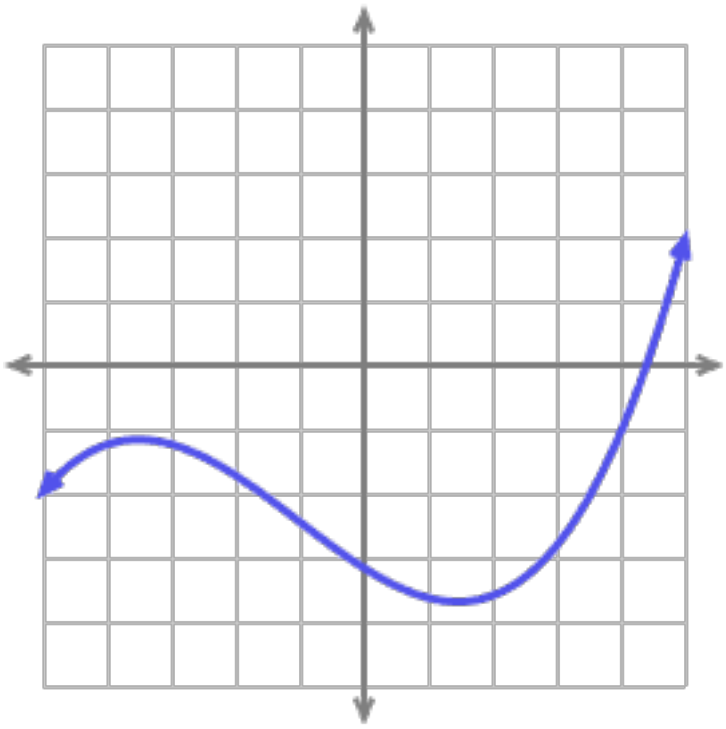
B)

C)



D)





2) Find these limits:

a)

$$\lim_{x \to -2^-} \frac{4x}{x+2}$$

b)

$$\lim_{x \to 3} 2^x$$

3) Determine the value of b to make $h(x)$ continuous at $x = -3$. Explain your reasoning using limits.

$$h(x) = \begin{cases} bx^2 - \frac{3}{2}x - 5 & x < -3 \\ -2x - 9 & x \geq -3 \end{cases}$$

4) Calculate the derivative of the following functions then evaluate at the given x:

a) $2x^2 + 4$ at $x = -3$

b) $x^{4-5x}3+x-5$ at $x = 5$

c) $\frac{5}{x^2}$ at $x = 2$

5) Find the slope of the tangent line in the graph below at $x = 2$. Describe in words how the slope of the tangent line represents the derivative. Could the tangent line match another point on the curve?