

Instructor: Grøndahl

Name: _____

MATH 241

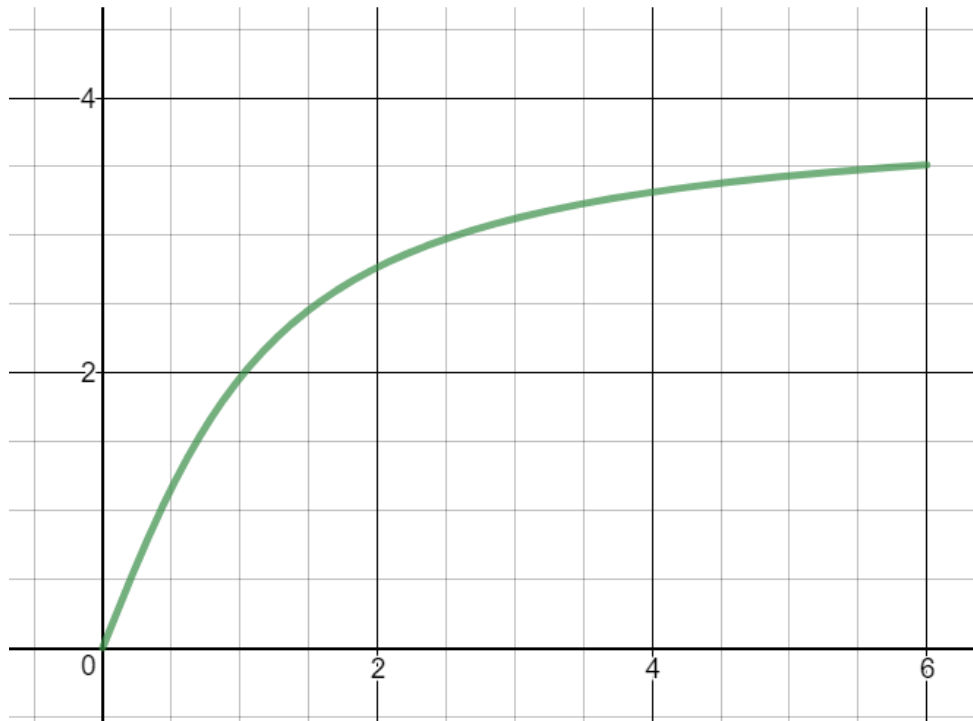
Project 2

Unit One Refresher

Due Wednesday November 15th

Be Sure to Use the Techniques from Unit One

- 1) The graph below shows the total distance s traveled by a bicyclist after t hours.
- Estimate the bicyclist's average speed over the time interval $[0, 6]$ hours
 - Estimate the bicyclist's instantaneous speed at time $t = 4$ (Help show your work by sketching on the graph)
 - Estimate the time at which the cyclist reached maximum speed.



- 2) Find the slope of $y = \frac{x}{x+1}$ at $\left(2, \frac{2}{3}\right)$ by determining the value that the average rate of change approaches as $h \rightarrow 0$

- 3) Evaluate $\lim_{x \rightarrow 5} \frac{x^2 - x - 20}{x^2 - 25}$ by simplifying the expression to something determinat.

4) Use the appropriate theorems or limit properties to evaluate $\lim_{x \rightarrow 0} \frac{\sin 5x}{\sin 4x}$

5) Use the graph below to find the following or state that it doesn't exist. If it doesn't exist, explain why.

a. $f(2)$

b. $\lim_{x \rightarrow 2} f(x)$

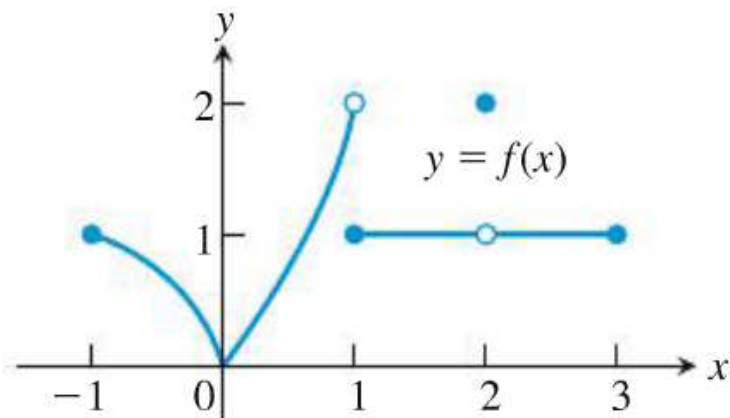
c. $\lim_{x \rightarrow 1} f(x)$

d. $\lim_{x \rightarrow 1^+} f(x)$

e. $\lim_{x \rightarrow 3^-} f(x)$

f. $\lim_{x \rightarrow -1} f(x)$

g. $f(-2)$



6) Give the equation of a continuous function that has 3 discontinuities.

7) Use the $\varepsilon - \delta$ definition of limit to prove that $\lim_{x \rightarrow 1} x^2 = 1$

8) Use limits to determine what value of a makes this function continuous.

$$f(x) = \begin{cases} x^3 - 1 & , x < -2 \\ 4ax & , x \geq 2 \end{cases}$$

9) Find $\lim_{x \rightarrow -\infty} \frac{4 - 3x^3}{\sqrt{x^6 + 9}}$ by simplifying the expression to something determinat.