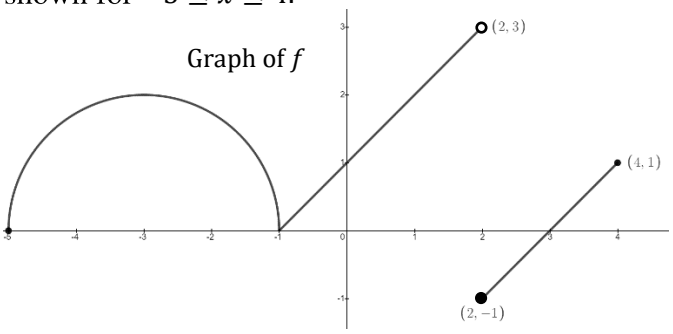
Unit 1: Limits & Continuity The piecewise function $f(x)$ is made of two line segments and a semi-circle as shown for $-5 \le x \le 4$.



a) $\lim_{x \to 0} f(x-1)$

b) $\lim_{x \to 0} f(2-x^2)$

c) $\lim_{x \to 0} \left(\frac{|x|}{x} \cdot f(x-1) \right)$

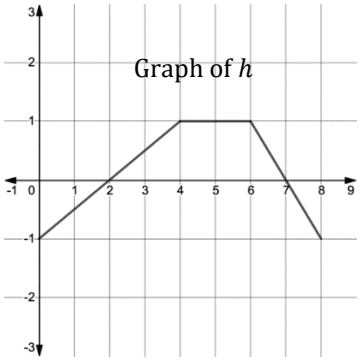
Unit 2: Differentiation

Given $f(-3) = 5, f'(-3) = -2,$ and $g(x) = \frac{1}{x}$. Let $h(x) = 4f(x) \cdot g(x)$. Find $\lim_{x \to -3} \frac{h(x) - h(-3)}{x+3}$.

Unit 3: Chain Rule

1.

x	$g(x)$	$g'(x)$
1	2	0.2
2	4	0.4
3	5	0.6
4	8	0.8



The function g is differentiable. The table gives values of g and its derivative g' at selected values of x. The function h, whose graph is shown above, consists of three line segments.

(a) Let k be the function defined by $k(x) = h\big(g(x)\big)$. Find $k'(1)$.

(b) Let m be the function defined by $m\big(g(x)\big) = x$. In other words, m and g are inverses. Find $m'(4)$.

2. Given the differential equation $\frac{dW}{dt} = \frac{1}{10}(W - 600)$, find $\frac{d^2W}{dt^2}$ in terms of W.

Unit 4: Contextual Applications of the Derivative

At the beginning of 2020, a landfill contained 1500 tons of solid waste. The increasing function W models the total amount of solid waste stored at the landfill. Planners estimate that W will satisfy the differential equation $\frac{dW}{dt} = \frac{1}{10}(W - 600)$ for the next 10 years. W is measured in tons, and t is measured in years from the start of 2020.

Use the line tangent to the graph of W at $t = 0$ to approximate the amount of solid waste that the landfill contains at the end of April 2020 (time $t = \frac{1}{3}$).

Unit 5: Analytical Applications of the Derivative

1. At the beginning of 2020, a landfill contained 1500 tons of solid waste. The increasing function W models the total amount of solid waste stored at the landfill. Planners estimate that W will satisfy the differential equation $\frac{dW}{dt} = \frac{1}{10}(W - 600)$ for the next 10 years. W is measured in tons, and t is measured in years from the start of 2020. Use the line tangent to the graph of W at $t = 0$ to approximate the amount of solid waste that the landfill contains at the end of April 2020 (time $t = \frac{1}{3}$). Find $\frac{d^2W}{dt^2}$ in terms of W. Use $\frac{d^2W}{dt^2}$ to determine if the tangent line approximation is an underestimate or an overestimate of the solid waste that the landfill contains at the time $t = \frac{1}{3}$.

2. Verify that the function $g(x) = \sqrt{x+2}$ satisfies the hypotheses of the Mean Value Theorem (MVT) on the interval $[-2, 0]$. Find all number(s) $x = c$, $-2 < c < 0$, that satisfy the conclusion of the MVT.

3. If $f(1) = 3$ and $f'(x) \geq 2$ for $1 \leq x \leq 4$, then what is the least value for $f(4)$?

Unit 6: Integration and Accumulation of Change

Rewrite as a definite integral and evaluate: $\lim_{n\to\infty} \sum_{k=1}^{n} \left(3\cos\left(\frac{\pi k}{n}\right) + 5\right)\left(\frac{\pi}{n}\right)$

Unit 7: Differential Equations

LORDY we have done enough of these!! Watch episodes 1-8, 21, 22 and search shared folder for resources.