

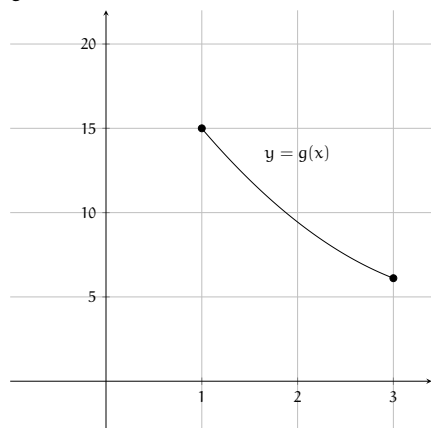
THE MEAN VALUE THEOREM

March 31, 2017

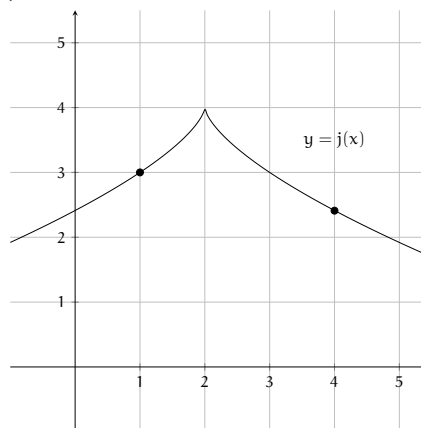
NAME: _____

- (1) Consider the graphs below. Can we guarantee that there is a point $(c, f(c))$, where the slope of the tangent line is the same as the slope of the secant line from a to b ?

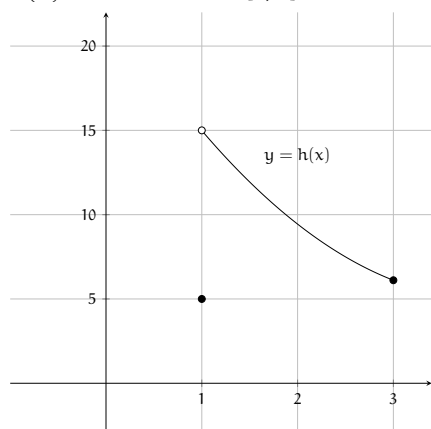
(a) $g(x)$ on the interval $[1, 3]$



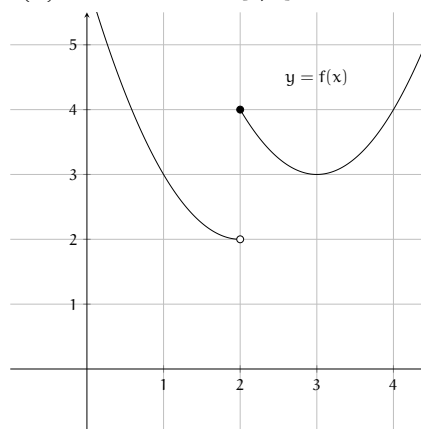
(c) $j(x)$ on the interval $[1, 4]$



(b) $h(x)$ on the interval $[1, 3]$



(d) $f(x)$ on the interval $[1, 3]$



- (2) I made some hot chocolate last night. It was 185°F . I let it cool while I played videogames. Twenty minutes later, the temperature of my not-quite-so-hot chocolate was 120°F . What does the Mean Value Theorem say about this situation? (Be specific to this case.)

(3) An elevator starts at ground level at time $t = 0$ seconds. At $t = 20$ seconds, the elevator has risen 100 feet. What does the Mean Value Theorem tell you about this situation?

(4) Let $g(x) = |x^2 - 1|$.

(a) Do the hypotheses of the MVT hold on $[0, 3]$? Explain.

(b) Do the conclusions of the MVT hold on $[1, 3]$? Explain.

(5) Does the MVT apply to $g(x) = x^{\frac{1}{3}}$ on $[0, 8]$? Why or why not? If so, find all values of c that satisfy the theorem.

(6) Find all values of c which satisfy the MVT for $h(x) = x^3 + 6x + 2$ on $[-1, 3]$.

(7) A car travels 110 miles in 2 hours. What does the MVT tell you?