

4.6 Approximating with Local Linearity

Calculus

Name: _____

CA #1

1. Let f be a function with $f(2) = -2$ such that for all points (x, y) on the graph of f the slope is given by $\frac{x^2-1}{2y}$. Write an equation for the line tangent to the graph of f at $x = 2$ and use it to approximate $f(2.2)$.

Answer the questions for each function listed.

2. $f(x) = x^2 - 5x$ is concave up at $x = 3$.
 a. What is the estimate for $f(3.2)$ using the local linear approximation for f at $x = 3$?

- b. Is it an underestimate or overestimate?
 Explain.

3. $f(x) = x \cos x$ is concave down at $x = \frac{\pi}{2}$
 a. What is the estimate for $f(1.5)$ using the local linear approximation for f at $x = \frac{\pi}{2}$? Round your answer to three decimal places.

- b. Is it an underestimate or overestimate?
 Explain.

4. f is concave up and $f(-3) = 2$ and $f'(-3) = 4$.
 a. What is the estimate for $f(-2.9)$ using the local linear approximation for f at $x = -3$?

- b. Is it an underestimate or overestimate?
 Explain.

5. f is concave down and $f(2) = -6$ and $f'(2) = 2$.
 a. What is the estimate for $f(1.8)$ using the local linear approximation for f at $x = 2$?

- b. Is it an underestimate or overestimate?
 Explain.

1. $y + 2 = -\frac{4}{3}(x - 2)$ $y \approx -2.15$	2a. $f(3.2) \approx -5.8$	2b. Underestimate because f is concave up.
3a. $f(1.5) \approx 0.111$	3a. $f(-2.9) \approx 2.4$	3b. Overestimate because f is concave down.
4a. $f(-2.9) \approx 2.4$	4a. $f(-2.9) \approx 2.4$	4b. Underestimate because f is concave up.
5a. $f(1.8) \approx -6.4$	5a. $f(1.8) \approx -6.4$	5b. Overestimate because f is concave down.

Answers to 4.6 CA #1