

4.6 Approximating with Local Linearity

Calculus

Name: _____

CA #2

1. Let f be a function with $f(3) = -5$ such that for all points (x, y) on the graph of f the slope is given by $\frac{2x^2}{y}$. Write an equation for the line tangent to the graph of f at $x = 3$ and use it to approximate $f(2.9)$.

Answer the questions for each function listed.

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| <p>2. $f(x) = \cos(3x)$ is concave down at $x = \frac{2\pi}{3}$.</p> <p>a. What is the estimate for $f(2)$ using the local linear approximation for f at $x = \frac{2\pi}{3}$?</p> <p>b. Is it an underestimate or overestimate? Explain.</p> | <p>3. $f(x) = \frac{x^2-3}{e^{x+1}}$ is concave up at $x = 0$.</p> <p>a. What is the estimate for $f(0.3)$ using the local linear approximation for f at $x = 0$?</p> <p>b. Is it an underestimate or overestimate? Explain.</p> |
| <p>4. f is concave up and $f(-1) = 2$ and $f'(-1) = -2$.</p> <p>a. What is the estimate for $f(-0.9)$ using the local linear approximation for f at $x = -1$?</p> <p>b. Is it an underestimate or overestimate? Explain.</p> | <p>5. f is concave down and $f(4) = -3$ and $f'(4) = 1$.</p> <p>a. What is the estimate for $f(4.2)$ using the local linear approximation for f at $x = 4$?</p> <p>b. Is it an underestimate or overestimate? Explain.</p> |

2a. $f(2) \approx 1$	3a. $f(0.3) \approx -1.275$	4a. $f(-0.9) \approx 1.8$	5a. $f(4.2) \approx -2.8$	
2b. Overestimate because f is concave down.	3b. Underestimate because f is concave up.	4b. Underestimate because f is concave up.	5b. Overestimate because f is concave down.	

Answers to 4.6 CA #2

$$1. y + 5 = -\frac{5}{18}(x - 3) \\ y \approx -4.64$$