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.

2. $f(x) = \cos(3x)$ is concave up at $x = \frac{2\pi}{3}$.
   a. What is the estimate for $f(2)$ using the local linear approximation for f at $x = \frac{2\pi}{3}$?

   b. Is it an underestimate or overestimate? Explain.

3. $f(x) = \frac{x^2-3}{e^x+1}$ is concave up at $x = 0$.
   a. What is the estimate for $f(0.3)$ using the local linear approximation for f at $x = 0$?

   b. Is it an underestimate or overestimate? Explain.

4. f is concave up and $f(-1) = 2$ and $f'(-1) = -2$.
   a. What is the estimate for $f(-0.9)$ using the local linear approximation for f at $x = -1$?

   b. Is it an underestimate or overestimate? Explain.

5. f is concave down and $f(4) = -3$ and $f'(4) = 1$.
   a. What is the estimate for $f(4.2)$ using the local linear approximation for f at $x = 4$?

   b. Is it an underestimate or overestimate? Explain.

Answers to 4.6 CA #2

1. $y + 5 = -\frac{18}{5}(x - 3)$ $y \approx -4.64$	2a. $f(2) \approx 1$ 2b. Underestimate because f is concave up.	3a. $f(0.3) \approx -1.275$ 3b. Underestimate because f is concave up.	4a. $f(-0.9) \approx 1.8$ 4b. Underestimate because f is concave up.	5a. $f(4.2) \approx -2.8$ 5b. Overestimate because f is concave down.