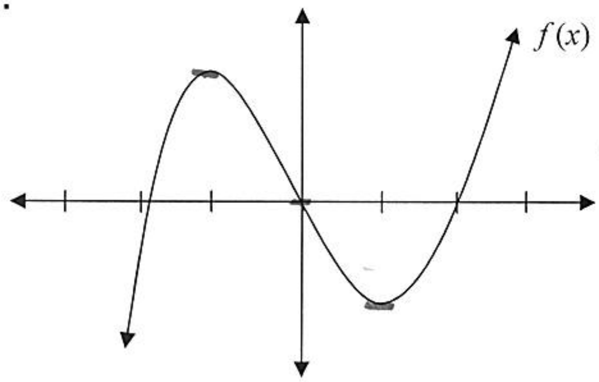
DATE: _______________

Given the graph of $f(x)$, describe find where $f'(x)$ and $f''(x)$ are zero, positive, and negative.

1.



f' = 0 @ x = -1, 0, 1

f'(x) > 0 on (-∞, -1) ∪ (1, ∞) b/c f inc

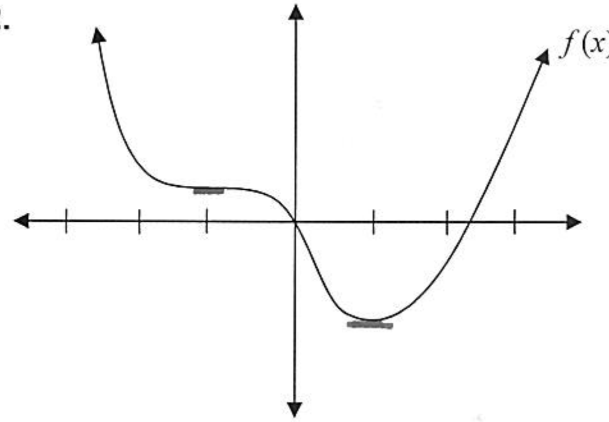
f'(x) < 0 on (-1, 1) b/c f dec

f''(x) = 0 @ x = 0 b/c f changes concavity

f'' > 0 on (0, ∞) b/c f is conc. up

f'' < 0 on (-∞, 0) b/c f is conc. down

2.



f'(x) = 0 @ x = -1, x = 1

f'(x) > 0 on (1, ∞) b/c f inc

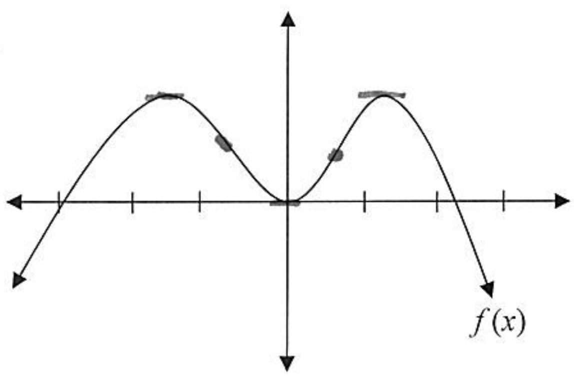
f'(x) < 0 on (-∞, -1) ∪ (-1, 1) b/c f dec

f''(x) = 0 @ x = -1, x = 0 b/c f changes concavity.

f''(x) > 0 on (-∞, -1) ∪ (0, ∞) b/c f concave up

f''(x) < 0 on (-1, 0) b/c f concave down

3.



f'(x) = 0 @ x = -1.5, 0, 1.5

f'(x) > 0 on (-∞, -1.5) ∪ (0, 1.5) b/c f inc

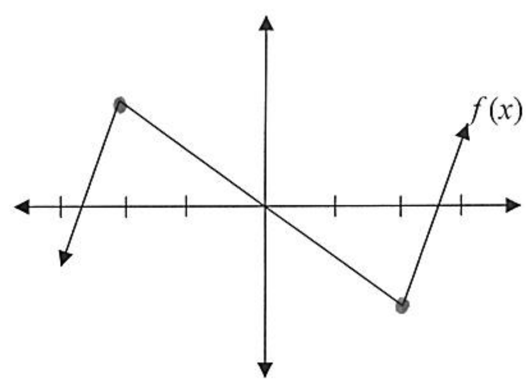
f'(x) < 0 on (-1.5, 0) ∪ (1.5, ∞) b/c f dec

f''(x) = 0 @ x = -1, x = 1 b/c f changes concavity

f''(x) < 0 on (-∞, -1) ∪ (1, ∞) b/c f concave down

f''(x) > 0 on (-1, 1) b/c f is concave

4.



f'(x) = 0 → nowhere

f'(x) DNE @ x = 2, x = -2

f'(x) > 0 on (-∞, -2) ∪ (2, ∞) b/c f inc

f'(x) < 0 on (-2, 2) b/c f dec

f''(x) = 0 nowhere b/c f doesn't have any concavity

f''(x) > 0 } nowhere

f''(x) < 0