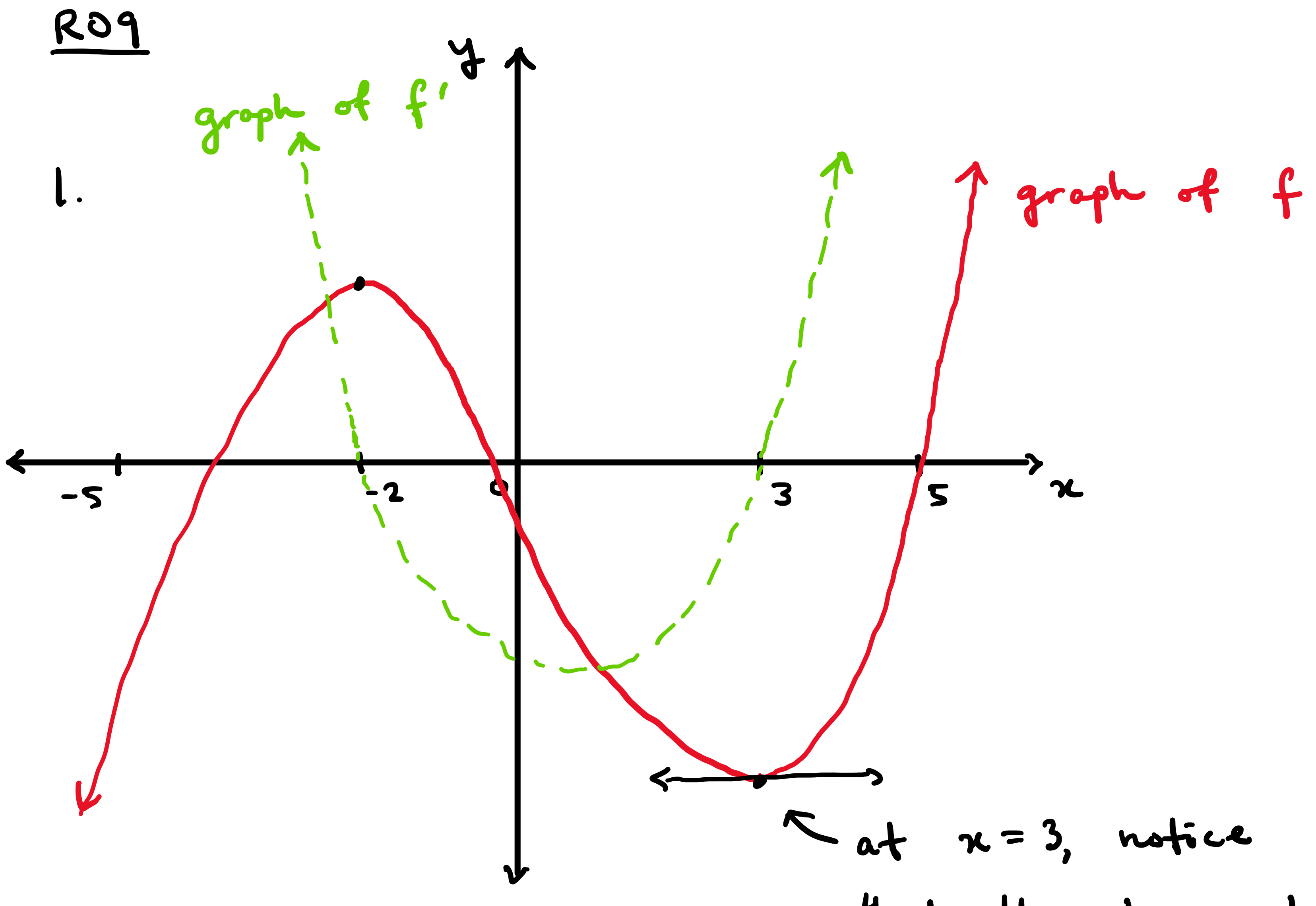
Quiz 5 solutions

Monday, March 15, 2021 3:16 PM

R09

1.



at $x = 3$, notice that the tangent line is horizontal, so $f'(3) = 0$.

2. Given $g(x) = \underbrace{(x^2+2)} \cdot \underbrace{\sin x}$,

$$\frac{d}{dx}(x^2+2) = 2x \quad \text{and} \quad \frac{d}{dx}(\sin x) = \cos x.$$

The product rule gives

$$g'(x) = 2x \cdot \sin x + (x^2+2) \cdot \cos x.$$

R02

1. $g(x) = \underbrace{x^2} \cdot \underbrace{e^x}$

$$\frac{d}{dx}(x^2) = 2x \quad \text{and} \quad \frac{d}{dx}(e^x) = e^x$$

Product rule: $g'(x) = \frac{d}{dx}(x^2) \cdot e^x + x^2 \cdot \frac{d}{dx}(e^x)$

$$= 2x \cdot e^x + x^2 \cdot e^x.$$

2. There is a horizontal asymptote of $y = 1$ at both $x \to \infty$ and $x \to -\infty$.

There is a vertical asymptote at $x = 1$.

f always has positive derivative (slopes are positive)

f is concave up for $x < 1$ and concave down for $x > 1$.