

Math 1a Homework Solutions

Section 3.7

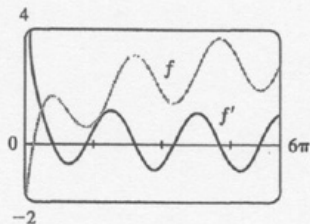
$$2. f(x) = \ln(x^2 + 10) \Rightarrow f'(x) = \frac{1}{x^2 + 10} \frac{d}{dx} (x^2 + 10) = \frac{2x}{x^2 + 10}$$

$$8. f(x) = \ln \sqrt[5]{x} = \ln x^{1/5} = \frac{1}{5} \ln x \Rightarrow f'(x) = \frac{1}{5} \cdot \frac{1}{x} = \frac{1}{5x}$$

$$14. y = \ln(x^4 \sin^2 x) = \ln x^4 + \ln(\sin x)^2 = 4 \ln x + 2 \ln \sin x \Rightarrow y' = 4 \cdot \frac{1}{x} + 2 \cdot \frac{1}{\sin x} \cdot \cos x = \frac{4}{x} + 2 \cot x$$

$$20. y = \ln(\sec x + \tan x) \Rightarrow y' = \frac{\sec x \tan x + \sec^2 x}{\sec x + \tan x} = \sec x \Rightarrow y'' = \sec x \tan x$$

26. $f(x) = \sin x + \ln x \Rightarrow f'(x) = \cos x + 1/x$. This is reasonable, because the graph shows that f increases when f' is positive, and $f'(x) = 0$ when f has a horizontal tangent.



$$32. y = x^{1/x} \Rightarrow \ln y = \frac{1}{x} \ln x \Rightarrow \frac{y'}{y} = \frac{1}{x} \left(\frac{1}{x} \right) + (\ln x) \left(-\frac{1}{x^2} \right) \Rightarrow y' = x^{1/x} \frac{1 - \ln x}{x^2}$$

$$36. y = x^{\ln x} \Rightarrow \ln y = \ln x \ln x = (\ln x)^2 \Rightarrow \frac{y'}{y} = 2 \ln x \left(\frac{1}{x} \right) \Rightarrow y' = x^{\ln x} \left(\frac{2 \ln x}{x} \right)$$