Lab Worksheet for September 14, 2021

Practice with Derivatives using the Product and Quotient Rule.

1.) Find the derivative of the following functions.

a.) $f(x) = x^2\ln(x)$.

b.) $g(x) = -\cos(x)(3x^3 - x^2)$

c.) $h(x) = e^x(x^2 - 3x)$

2.) Find the derivative of the following functions.

a.) $f(x) = \frac{2x^5}{x}$.

b.) $g(x) = \frac{ln(x)}{sin(x)}$.

c.) $h(x) = \frac{2x^6 - x^2}{3x^4}$.

3.) Find the derivative of the following functions.

a.) $f(x) = (23x^3 + \cos(2x)\sin(x)$.

b.)$g(x) = \frac{ln(2x)+4e^x}{x-cos(4x^3)}$.

c.) $h(x) = e^{2x-5}(x^{3/2} - 3\ln(x^3)) - \cos(x) + 344444455$.

4.) The population of buffalo at Shimizu Ranch is modeled by the function

$$B(t) = (3t - 5)e^t + 8$$

where t is in units of years from now, and the population of buffalo, B(t), is in hundreds of buffalo. (For example, at t = 0 —i.e., right now—there are 300 buffalo. At $t = \frac{1}{3}$ —i.e., 4 months from now—there will be approximately

$(8 - 2e^{1/3}) \cdot 100$ buffalo.)

What will the rate of change of the buffalo's population be, 4 years and 8 months from now?

5.) Let $f(x) = 2x^2$ and $g(x) = \frac{x}{\ln(x)}$.

Find the derivative of $g(f(x))$.