APPM 1350 Recitation, Fall 2021, Week 5, Sep 21

1

Use the limit definition to find the derivative of the following functions at the given points:

a) $f(x) = \frac{1}{x}$ at $x = 2$.

b) $g(x) = |x - 6|$ at $x = 6$.

c) $g(x) = \sqrt{9 - x}$ at any x.

2

Find the derivatives of the following functions:

a) $f(x) = x^2 + \frac{4}{x^3}$

b) $g(x) = A\cos(x) + B\sin(x) + C$ (A, B, and C are constants)

c) $h(x) = \frac{\sqrt[10]{x}}{50} - \frac{19}{\sqrt[4]{x}}$

d) $y(x) = \frac{\sqrt{x}+x^2}{x}$

3

Suppose we a weight hanging from spring. The spring is bouncing up and its position relative to the ground at any time t is given by

$$p(t) = 2\sin(t) + 5.$$

a) For any time $t > 0$, find the instantaneous velocity of the weight.

b) At what times does the weight change directions?

c) What is the maximum and minimum height of the weight

4

a) Find the equation of the line that is tangent to the given function at the given point: $y = \sqrt{x} + 5\sin(x)$ at $(\pi, \sqrt{\pi})$.

b) Find the equation of the line that is normal to $y = x - \sqrt{x}$ at the point $(4, 2)$.

c) Find the equation of the line tangent to the curve $y = x\sqrt{x}$ and parallel to the line $-3x + y = 1$.

5

Prove that $\frac{d}{dx}[f(x) - g(x)] = \frac{d}{dx}f(x) - \frac{d}{dx}g(x)$ using the limit definition of the derivative.