

MATH 135: Quiz 6

October 14, 2014

Name: _____ Sec: _____

1. Consider the table below defining values for the functions u and v and their derivatives.

x	1	2	3	4
$u(x)$	3	5	4	-1
$v(x)$	6	3	2	-3
$u'(x)$	4	-2	-3	1
$v'(x)$	-5	-1	2	6

Define the functions

$$f(x) = u(x)v(x) \qquad g(x) = v(u(x)) \qquad h(x) = \frac{v(x)}{u(x) + 1}.$$

Compute the following derivatives using the numbers in the table above (and the rules you know for taking derivatives):

(a) $f'(4)$

(b) $g'(1)$

(c) $h'(3)$

2. The equation for the height $h(t)$ a falling object under gravitational acceleration g , initial velocity v_0 , and initial height h_0 is

$$h(t) = -\frac{1}{2}gt^2 + v_0t + h_0.$$

An adventurer has found himself on a planet fairly similar to that of Earth. He is standing on top of a tall building and **drops** a baseball off the edge. After 3 seconds, the ball has traveled a quarter of the way down the building (that is, the height after 3 seconds is $\frac{3}{4}$ of what it was initially). The gravitational acceleration on this planet is $g = 8 \text{ m/s}^2$.

- (a) What is the initial velocity of the ball? (This does not require any work)
- (b) What is the height of the building?
- (c) At what time does the ball hit the ground?
- (d) What is the impact velocity of the ball? (Velocity when the ball hits the ground)