

# MATH 135: Quiz 5

October 7, 2014

Name: \_\_\_\_\_ Sec: \_\_\_\_\_

1. 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 astronaut is standing on the edge of a cliff on Jupiter's moon, Io. He throws a rock straight up, and it reaches its maximum height 2 seconds after it is thrown. This maximum height is 36 meters above the **bottom** of the cliff. The gravitational acceleration on Io is  $g = 2 \text{ m/s}^2$ .

- (a) What is the initial velocity of the rock?
- (b) What is the height of the cliff?
- (c) At what time does the rock hit the ground?
- (d) What is the impact velocity of the rock? (Velocity when the rock hits the ground)

**2.** Consider the function

$$f(x) = (x^2 + 3x - 4)^3$$

(a) Find  $f'(x)$ .

(b) Find all points  $x$  where the graph of  $f$  has a horizontal tangent line.