

**Math 171 - Quiz 5**

September 26, 2013

Name key

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations when necessary.

1. (7 points) An object is launched upward with an initial speed of 64 ft/sec over the side of a 192-ft cliff.

- (a) Determine the function that gives the object's height at time  $t$ .

$$s(t) = -16t^2 + 64t + 192 \quad \text{in FT}$$

- (b) Determine the object's velocity function.

$$s'(t) = v(t) = -32t + 64 \quad \text{in FT/sec}$$

- (c) When will the object reach its maximum height?

$$v(t) = 0 \Rightarrow -32t + 64 = 0 \Rightarrow t = 2 \text{ sec}$$

- (d) What is the object's maximum height?

$$s(2) = -16(4) + 64(2) + 192 = 256 \text{ FT}$$

- (e) When will the object hit the ground?

$$s(t) = 0 \Rightarrow -16(t^2 - 4t - 12) = -16(t-6)(t+2) = 0$$

$$t = 6 \text{ sec}$$

- (f) What is the speed of the object as it hits the ground?

$$|v(6)| = |-32(6) + 64| = |-128| \text{ FT/sec} = 128 \text{ FT/sec}$$

- (g) Determine the object's acceleration function.

$$s''(t) = v'(t) = a(t) = -32 \quad \text{in FT/sec}^2$$

TURN OVER.

2. (3 points) Find each higher-order derivative.

$$(a) \frac{d^3}{dx^3} \underbrace{(x^7 - 4x^5 - 5 \cos x)}_{f(x)}$$

$$f'(x) = 7x^6 - 20x^4 + 5 \sin x$$

$$f''(x) = 42x^5 - 80x^3 + 5 \cos x$$

$$f'''(x) = 210x^4 - 240x^2 - 5 \sin x$$

$$(b) \frac{d^2}{dr^2}(\sec r) = \frac{d}{dr} (\sec r \tan r)$$

$$= \sec r \tan^2 r + \sec^3 r$$

(PRODUCT RULE)