Math 171 - Quiz 5X

October 3, 2013

Name __key__

Score _____

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

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1. (5 points) An object is launched upward with an initial speed of 88 ft/sec over the side of a 212-ft cliff. Find the object's maximum height and its speed when it hits the ground.

$$s(t) = -16t^2 + 88t + 212$$

$$s'(t) = -32t + 88$$

$$s'(t) = 0 \Rightarrow t = \frac{88}{32}$$

$$\text{MAX HEIGHT} = s\left(\frac{88}{32}\right) = \boxed{333 \text{ FT}}$$

HITS GROUND WHEN $s(t) = 0$

$$-16t^2 + 88t + 212 = 0$$

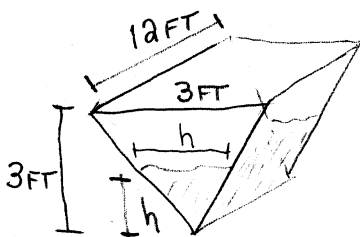$$\Rightarrow t = \frac{3\sqrt{37} + 11}{4} \approx 7.312 \text{ SEC}$$

IMPACT SPEED =

$$\left| s'(7.312) \right|$$

$$\approx \boxed{145.986 \text{ FT/SEC}}$$

2. (5 points) Problem #20, Section 2.6, Page 154

h = HEIGHT OF WATER AT TIME t

V = VOLUME AT TIME t

a) $\frac{dV}{dt} = 2 \text{ FT}^3/\text{MIN}$. FIND $\frac{dh}{dt}$ WHEN $h = 1$.

$$V = \left(\frac{1}{2}h^2\right)(12) = 6h^2$$

$$\frac{dV}{dt} = 12h \frac{dh}{dt}$$

WHEN $h = 1$...

$$2 = 12(1)\frac{dh}{dt} \Rightarrow \boxed{\frac{dh}{dt} = \frac{1}{6} \text{ FT/MIN}}$$

b) $\frac{dh}{dt} = \frac{3}{8(12)} \text{ FT/MIN}$ WHEN $h = 2$.

FIND $\frac{dV}{dt}$.

$$\frac{dV}{dt} = (12)(2)\left(\frac{3}{8(12)}\right) = \boxed{\frac{3}{4} \text{ FT}^3/\text{MIN}}$$