HW 2 written #35 B37

35. snow speed $v = \sqrt{2gh}$. dropped from height h

$F = ma$

$-mg = ma$

$a = -g$ or $x'' = -g$

$x_0 = h$ $\quad v_0 = 0$

$$v(t) = \int -g\,dt = -gt + C_1$$

$v(0) = C = 0$

$\therefore v(t) = -gt$

$$x(t) = \int -gt = \frac{-gt^2}{2} + C_2$$

$x(0) = h = C_2$

$x(t) = \frac{-gt^2}{2} + h$

Strikes ground when $x(t) = 0$

$$\frac{-gt^2}{2} + h = 0$$

$$t = \sqrt{\frac{2h}{g}}$$

$$v(t) = g\sqrt{\frac{2h}{g}} = -\sqrt{2hg}$$

Speed is $|v(t)| = \sqrt{2gh}$ ✓

37. starts @ noon @ A. const accel. reach B after 50 min w/ velocity of 60 m. dist bt A to B

$v(\frac{5}{6}) = 60$ $\quad 50\text{min} \cdot \frac{1\text{hr}}{60\text{min}} = \frac{5}{6}$

$v(t) = at + C_1$

$v(0) = C_1 = 0$

$= v(t) \quad v(t) = at$

$\hookrightarrow x(t) = \frac{1}{2}at^2 + v_0t + C_2$

$x(0) = C_2 = 0$

$v(\frac{5}{6}) = at = 60$

$a = 72$

$x(50) = \frac{1}{2}(72)(\frac{5}{6})^2 + 0 + 0$

$= 25$ miles