FIRST MIDTERM

A ball is thrown up from the ground beside a building that is 75.0 m high.

(a) What is the minimum initial velocity needed so that the ball will just reach the top of the building?

(b) If the initial upward velocity is 50.0 m/s, how much time elapses before the ball strikes the roof on its way down?

(c) What is the velocity of the ball when it strikes the roof in part (b)?

\[ v_y = v_{0y} - gt \]

\[ v_y = 38.3 \text{ m/s} \]

(b) \[ v_{0y} = 50 \text{ m/s}; \quad y_0 = 0; \quad y_f = 75 \text{ m} \]

\[ v_{0y} = 50 - 9.8t \]

\[ t = \frac{-50 \pm \sqrt{2500 + (9.8)(75)}}{19.6} \]

\[ t = 3.2 \text{ s or } 8.38 \text{ sec} \]

(c) \[ v_y = 50 - 9.8\left(\frac{1}{2} \cdot 19.6\right) \]

\[ v_y = 38.3 \text{ m/s} \]