Quiz 2

One end of a string is attached to a transverse wave generator; the other end is passed over a massless, frictionless pulley and attached to a weight of mass M.

1. If the length of the string is doubled, what happens to the fundamental harmonic frequency?
   a. It is doubled.
   b. It goes up by $\sqrt{2}$.
   c. It stays the same.
   d. It goes down by $\sqrt{2}$.
   e. It is halved.
   f. None of the above.

2. If the mass M is doubled, what happens to the fundamental frequency?
   a. It is doubled.
   b. It goes up by $\sqrt{2}$.
   c. It stays the same.
   d. It goes down by $\sqrt{2}$.
   e. It is halved.
   f. None of the above.

3. Now consider two strings set up as above. The first is oscillating at its fundamental frequency of 100 Hz. The other string is twice as long as the first and is oscillating at its *second* harmonic frequency. What is the beat frequency you hear?
   a. 0 Hz
   b. 50 Hz
   c. 100 Hz
   d. 150 Hz
   e. 200 Hz

Some Equations

$v = \lambda f \qquad T = 1/f \qquad v = \sqrt{\gamma kT/m} \qquad v = \sqrt{B_a/\rho} \qquad v = \sqrt{\frac{LT}{m}}$

$f_n = n\frac{v}{2L} \qquad \sin\theta = 1.22\frac{\lambda}{D} \qquad y = A\sin(2\pi ft \pm 2\pi x/\lambda) \qquad f_o = f_s\frac{v \pm v_o}{v \mp v_s}$