1. A pulse travels on a string under tension. The transverse displacement of the string from its equilibrium position is given by $y(x - 150t)$ where $x$ is in meters and $t$ is in seconds.

   a) The pulse ($y$) is plotted as a function of $x$ for $t = 0$ in the top panel. In the middle and bottom panels, draw the pulse as a function of $x$ for $t = 0.04$ s (2 points) and as a function of $t$ for $x = 0$ (2 points).

   b) If the mass per unit length of the string, is 0.01 kg/m, what is the tension in the string? (2 points)

Rewrite and sign the Honor Pledge: I pledge my honor that I have not violated the Honor Code during this examination.
2. One day, you’re enjoying a soft drink when you blow across the top of the bottle generating a tone. Having just finished Learning Guide 8, you decide to calculate the frequency of the tone you hear. You assume the speed of sound in air is $v = 340 \text{ m/s}$ and you estimate your empty soft drink bottle approximates a tube, closed on one end, open on the other, and $L = 0.20 \text{ m}$ high. What is the lowest frequency you can get from your soft drink bottle? (2 points)

3. You are standing along the side of a road when a speeding ambulance goes by. Before it passed you, you heard the siren at a frequency $f_1 = 1060 \text{ Hz}$. After it passes, the frequency of the siren you hear is $f_2 = 950 \text{ Hz}$. How fast was the ambulance going? Assume $v_{\text{sound}} = 340 \text{ m/s}$ and there is no wind. (2 points)