

Question 9: ~~10~~

$$\frac{1}{2} k x_1^2 = \frac{1}{2} m v_1^2$$

$$v_1 = \sqrt{\frac{k x_1^2}{m}}$$

$$\frac{2.22 - 0.27}{v_1} = t$$

$$\frac{1}{2} k x_2^2 = \frac{1}{2} m v_2^2$$

$$v_2 = \sqrt{\frac{k x_2^2}{m}}$$

$$\frac{2.2}{t} = \sqrt{\frac{k x_2^2}{m}}$$

$$\frac{2.2 - 0.27}{\sqrt{\frac{k x_1^2}{m}}} = \frac{2.2}{\sqrt{\frac{k x_2^2}{m}}}$$

$$2.2 \approx \frac{1.91}{\sqrt{\frac{k x_2^2}{m}}} = \sqrt{\frac{k x_2^2}{m}}$$

$$1.14 \sqrt{\frac{k x_1^2}{m}} = \sqrt{\frac{k x_2^2}{m}}$$

$$1.2996 x_1^2 = x_2^2$$

$$x_2 = 1.254 m$$

Question 10

(a) $mg \sin \theta - f = ma$

$$f r = I \alpha$$

(b) $KE = \frac{1}{2} m v_f^2 + \frac{1}{2} I \omega^2 = PE$

$$mgh = \frac{1}{2} m v_f^2 + \frac{1}{2} \cdot \left(\frac{1}{2} m r^2 \cdot \frac{v^2}{r^2} \right)$$