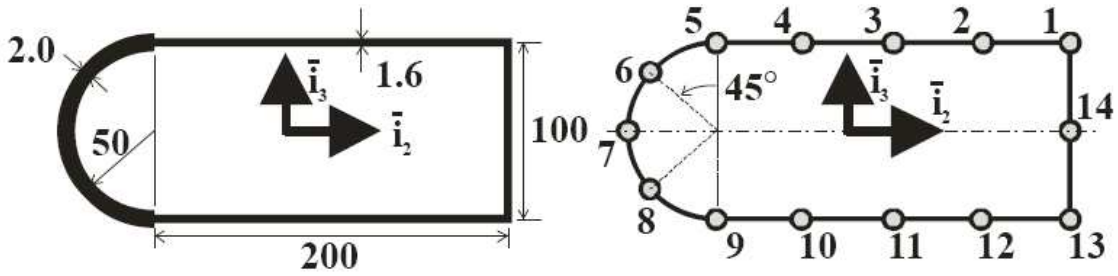
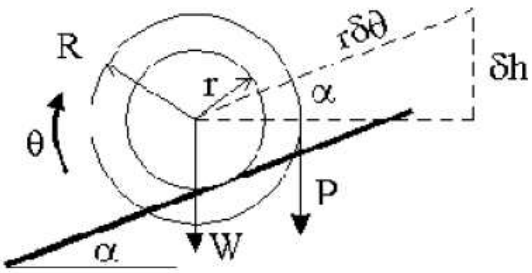
8.67



$$A = \frac{1}{2}\pi R^2 + bh = 0.023927$$

$$H_{11} = 4A^2 / \left(\frac{\pi R}{Gt_r} + \frac{2b+h}{Gt_b} \right) = 175686$$

9.2



$$\delta Work = P\delta a - W\delta h = 0$$

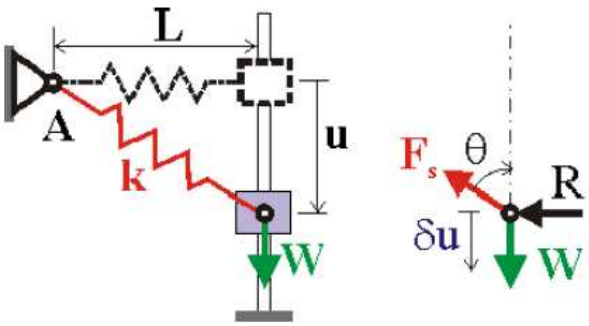
$$\delta a = R\delta\theta - \delta h$$

$$\delta h = r\delta\theta \sin\alpha$$

$$\delta(PR - r(P+W)\sin\alpha) = 0$$

$$\sin\alpha = \frac{PR}{r(P+W)}$$

9.6



$$\delta Work = W\delta u - F_s \cos(\theta)\delta u$$

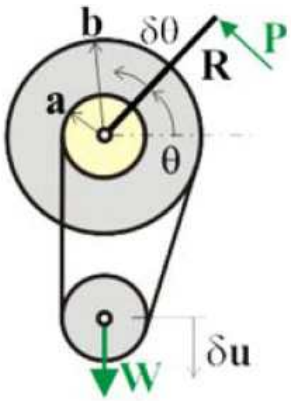
$$F_s = ke = k(\sqrt{u^2 + L^2} - L)$$

$$\cos\theta = \frac{u}{\sqrt{u^2 + L^2}}$$

$$\delta Work = \left(-\frac{ku\left(-L + \sqrt{L^2 + u^2}\right)}{\sqrt{L^2 + u^2}} + W \right)\delta u = 0$$

$$\frac{ku\left(-L + \sqrt{L^2 + u^2}\right)}{\sqrt{L^2 + u^2}} = W$$

9.9



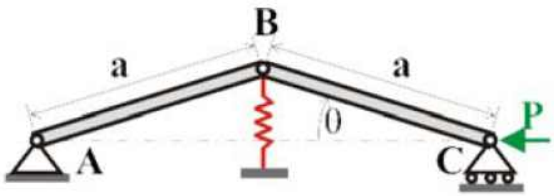
$$\delta Work = W\delta u + RP\delta\theta$$

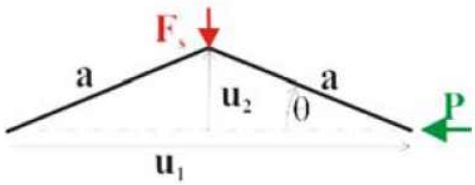
$$\delta u = \frac{a\delta\theta - b\delta\theta}{2}$$

$$\delta Work = \frac{1}{2}(2PR + (a-b)W)\delta\theta = 0$$

$$P = -\frac{(a-b)W}{2R}$$

9.11





$$\delta Work = -P\delta u_1 - F_s\delta u_2$$

$$u_1 = 2a\cos\theta$$
$$u_2 = a\sin\theta$$

$$\delta u_1 = -2a\delta\theta\sin\theta$$
$$\delta u_2 = a\delta\theta\cos\theta$$

$$F_s = ku_2$$

$$\delta Work = a\delta\theta(2P - ak\cos\theta)\sin\theta = 0$$

To make the bar remaining straight, θ = 0 or 2P-akcos θ = 0

$$P_{critical} = \lim_{\theta\to 0}(\frac{1}{2}ak\cos\theta) = \frac{1}{2}ak$$