

Quiz 3 answer

$$a = \frac{[0.9(100)]^2}{50} = 162 \text{ kpsi}$$

$$b = -\frac{1}{3} \log \frac{0.9(100)}{50} = -0.085091$$

$$\sigma_1 = 70 \text{ kpsi}, \quad N_1 = \left(\frac{70}{162} \right)^{1/-0.085091} = 19\,170 \text{ cycles}$$

$$\sigma_2 = 55 \text{ kpsi}, \quad N_2 = \left(\frac{55}{162} \right)^{1/-0.085091} = 326\,250 \text{ cycles}$$

$$\sigma_3 = 40 \text{ kpsi}, \quad N_3 \rightarrow \infty$$

$$\frac{0.2N}{19\,170} + \frac{0.5N}{326\,250} + \frac{0.3N}{\infty} = 1$$

$$N = 83\,570 \text{ cycles}$$