Question #3

$$\sigma^2_{post} = \frac{\sigma_0^2 \sigma^2}{\sigma^2 + N\sigma_0^2}$$

$$\mu_{post} = \frac{\mu_0 \sigma^2 + N\bar{x}\sigma_0^2}{\sigma^2 + N\sigma_0^2}$$

$$(\mu_{post} + 1.96\,\sigma_{post}) - (\mu_{post} - 1.96\,\sigma_{post}) = 7$$

$$\frac{\mu_0(5) + N\bar{x}(10)}{5 + N(10)} + 1.96\sqrt{\frac{10.5}{5+N(10)}} - \frac{\mu_0(5) + N\bar{x}(10)}{5 + N(10)} + 1.96\sqrt{\frac{10.5}{5+N(10)}} \leq 7$$

$$3.92\sqrt{\left(\frac{50}{5+10N}\right)} = 7$$

$$\sqrt{\frac{50}{5+10N}} = 1/3.92$$

$$\frac{50}{5+10N} = 1/15.37$$

$$50 = 1/15.37\,(5+10N)$$

$$768.3 = 5 + 10N$$

$$763.3 = 10N$$

$$76.33 = N$$

Minimum N is 77