2a

$$z - score_{83} = 2.33 = \frac{83 - 65}{\sigma}$$
$$\sigma = \frac{18}{2.33}$$
$$\sigma = 7.725$$

2b

$$X \sim \mathcal{N}(50, 5)$$
$$P(X < 48) = 0.346$$
$$3 * \frac{1}{0.346} = 8.67$$

I would have to talk to roughly 9 people to meet 3 people scoring less than 48.

3

$$z - score_{ucsd}3.6 = \frac{3.6 - 3.17}{\sigma}$$
$$z - score_{ucm}3.8 = \frac{3.8 - 3.56}{0.4}$$
$$z - score_{ucsd}3.6 = z - score_{ucm}3.8$$
$$\frac{3.6 - 3.17}{\sigma} = \frac{3.8 - 3.56}{0.4}$$
$$\sigma = 0.72$$

4

$$qnorm(0.975) = 1.96$$

5

$$std\_z(0.99) = 2.33$$
$$2.33 = \frac{16 - \mu}{0.2}$$
$$\mu = 16 - 2.33 * 0.2$$
$$\mu = 15.534$$

5

$$
\begin{aligned}
X &\sim \mathcal{N} \\
p(X=x) &= \frac{e^{-\frac{(x-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi\sigma^2}} \\
\frac{dp(x)}{dx} &= \frac{-(x-u)e^{\frac{-(x-\mu)^2}{2\sigma^2}}}{\sqrt{\sigma^6 2\pi}} \\
&= \frac{-(x-\mu)}{\sigma^2}p(x) \\
\frac{d^2p(x)}{dx^2} &= \frac{-p(x)}{\sigma^2} - \frac{(x-\mu)}{\sigma^2} \\
&= (\frac{(x-\mu)^2}{\sigma^4} - \frac{1}{\sigma^2})p(x) \\
\frac{d^2p(x)}{dx^2} = 0 &= (\frac{(x-\mu)^2}{\sigma^4} - \frac{1}{\sigma^2})p(x) \\
0 &= \frac{(x-\mu)^2}{\sigma^4} - \frac{1}{\sigma^2} \\
0 &= (x-\mu)^2 - \sigma^2 \\
\sigma^2 &= (x-\mu)^2 \\
x &= \mu \pm \sigma
\end{aligned}
$$

R1

By squaring $\mathbb{N}$ all the negative points becomes positive hence integration starts at 0.

$$\int_0^\infty x^2 \cdot \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} dx = 1$$