Sampling Distribution Homework

11.13 More on insurance

mean annual loss from damage $\mu = \$75$
std dev $\sigma = \$300$

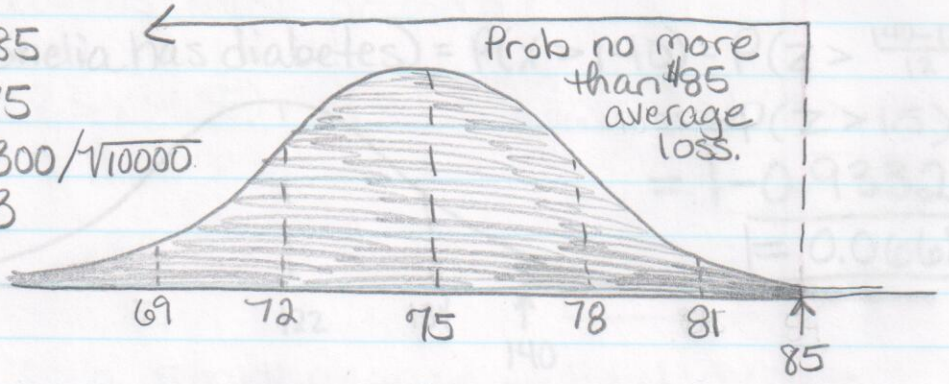
Right skewed b/c most policies have $0 loss with only a few large losses.

$n = 10{,}000$ policies

Will the average loss be no greater than $85?

Is the population Normal? NO
Is $n \geq 30$? YES $n = 10{,}000$

$\bar{x} = 85$
$\mu = 75$
$\sigma_{\bar{x}} = 300/\sqrt{10000}$
$= 3$



$$P(\bar{x} < 85) = P\left(z < \frac{85-75}{3}\right) = P(z < 3.33)$$
$$= 0.9996$$

11.27 Glucose Testing

Let X be Shelia's measured glucose level

- A patient is classified as having gestational diabetes if the glucose level is above 140 mg/dl one hour after having a sugary drink.
- Glucose level 1 hour after sugary drink varies according to N(122, 12)

$\mu = 122$ mg/dl
$\sigma = 12$ mg/dl

(a) Single glucose measurement
$n = 1$

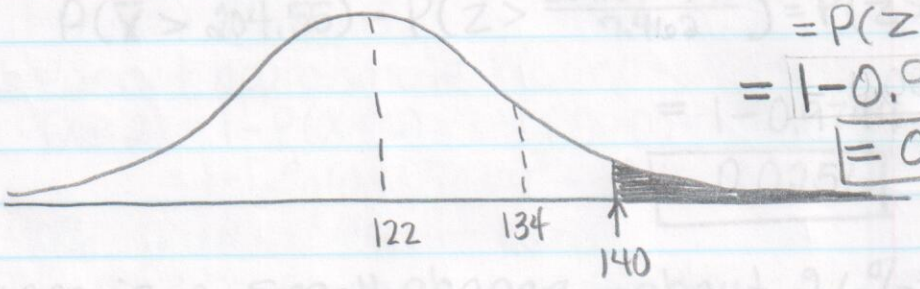
Is population Normal? Yes

$P(\text{Shelia has diabetes}) = P(X > 140) = P(z > \frac{140-122}{12})$

$= P(z > 1.5)$

$= 1 - 0.9332$

$= \boxed{0.0668}$



(b) 4 measurements $n = 4$

$n < 30$ but population is Normal

$\sigma_{\bar{x}} = \frac{12}{\sqrt{4}} = 6$ $\bar{x}$ has $N(122, 6)$

$P(\bar{x} > 140) = P(z > 3) = 1 - 0.9987 = \boxed{0.0013}$

11.34 Airline passengers get heavier

$\mu = 190$ pounds
$\sigma = 35$ pounds

Weights are not very non-Normal.

$n = 22 \qquad \mu_{\bar{x}} = 190 \qquad \sigma_{\bar{x}} = \frac{35}{22} = 7.462$

What is the approx. probability that the total weight of passengers exceeds 4500 pounds?

Restate

What is the approx. probability that the mean weight of 22 passengers exceeds 204.55 pounds?

$$P(\bar{x} > 204.55) = P\left(z > \frac{204.55 - 190}{7.462}\right) = P(z > 1.95)$$

$$= 1 - 0.9744$$

$$\boxed{= 0.0256}$$

There is a small chance – about 2.6% – that the total weight exceeds 4500 pounds.