Santiago Bermudez
12-6-22
Stat 115a

From #3
$X \sim N(\mu, \sigma^2)$ $\sigma = SD$ $z = \frac{x-\mu}{\sigma}$

1. $X \sim N(104, 5^2)$
$\sigma = 5$

a) $P(X=105)$? $\rightarrow P\left(\frac{x-\mu}{\sigma} = \frac{105-104}{5}\right) \rightarrow P(Z = 0.2)$

b Probability at a fixed point is 0!

So, $\boxed{P(X=105) = 0}$

b) $P(X<105)$? $\rightarrow P\left(Z < \frac{105-104}{5}\right) \rightarrow P(Z<0.2)$

$P(Z<0.2) = 0.5793$ * from z-table

$\boxed{P(X<105) = 0.5793}$

c) $P(X \leq 105)$?

$P(X \leq 105)$ is the same as $P(X<105)$ in a normal distribution, so...

$\boxed{P(X \leq 105) = 0.5793}$

2. $X \sim N(0.3, 0.06^2)$
$\sigma = 0.06$

a) $P(X > 0.25)$? $\rightarrow P\left(Z > \frac{0.25-0.3}{0.06}\right) = P(Z > -0.83)$

$P(Z > -0.83) =$ * from z-table
$z = -0.83 = 0.2033$
$1 - 0.2033 = 0.7967$

So, $\boxed{P(X > 0.25) \approx 0.7967}$

cont'd

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Stat 156

(cont'd)

b) How would you characterize lowest 8% of all X values?

Above 92nd percentile, so

$$z = \frac{x-\mu}{\sigma} \rightarrow 1.645 = \frac{x-0.3}{0.06}$$

* Run z-table

$$0.06 \cdot 1.645 = x - 0.3 \quad 0.06 = 0.0987 = x - 0.3$$

$$+0.3 \qquad +0.3$$

$$x = 0.3987$$

The largest 8% of all X are above 0.3987!

3. $X \sim N(15, 1.25^2)$

$\sigma = 1.25$

$$P(|X-15| \leq 3)? \rightarrow P(-3 \leq X-15 \leq 3)$$

$$= P(-3+15 \leq X \leq 3+15)$$

$$= P(12 \leq X \leq 18)$$

$$= P\left(\frac{12-15}{1.25} \leq \frac{X-\mu}{\sigma} \leq \frac{18-15}{1.25}\right)$$

$$= P(-2.4 \leq Z \leq 2.4)$$

$$= P(Z \leq 2.4) - P(Z \leq -2.4)$$

$$= 0.9918 - 0.0082$$

$$= 0.9836$$

$P(|X-15| \leq 3) = 0.9836$

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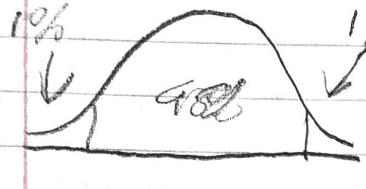
Stat 115

Exam #3

4. $X \sim N(6.8, 2.8^2)$
$\sigma = 2.8$
Value c such that interval includes 98% of all values?



Critical z-value of 1% on A 98% should be ±2.33!

$C = z * \sigma = 2.33 * 2.8 = \boxed{6.524}$

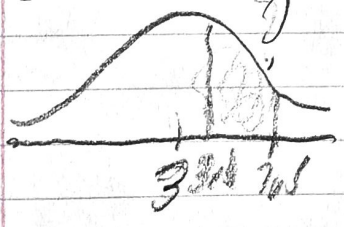
5. a) $P(z < -1.5)$?
Area under -1.5 is 0.0668, so what gives us left value?

$\boxed{\text{pnorm}(-1.5)}$

b) $P(z > -1.5)$?
$1 - 0.0668 = 0.9332$ ← what gives us right value?

$\boxed{1 - \text{pnorm}(-1.5)}$

c) $P(3.1 < X < 3.5)$; $X \sim N(3, 2^2)$, $\sigma = 2$



$\boxed{\text{pnorm}(3.5, 3, 2) - \text{pnorm}(3.1, 3, 2)}$