

Score:

Name:

Section (circle one): 1 2 3 4 5 6

Team (circle one): a b c d e f

SM316 – Quiz #1 (Section 5.1-5.3, 6.1-6.3) – Due Monday

Take home quiz, open book, open notes. You may work with team members to solve problems, but you may not copy another's work. Calculators are allowed, but you must show all work for full credit.

1. (3 points) Research has shown that the need for money to buy drugs is stated as the reason for 75% of all thefts. Find the probability that among the next 5 thefts,
- a. Exactly 3 thefts are attributed to the need to buy drugs.

$$P(X=3) = \binom{5}{3} (.75)^3 (.25)^2 = \frac{5!}{3!2!} (.75)^3 (.25)^2$$
$$= \underline{\underline{.2637}}$$

- b. At most, 3 thefts are attributed to the need to buy drugs.

$$P(X \leq 3) = \binom{5}{1} (.75)^1 (.25)^4 + \binom{5}{2} (.75)^2 (.25)^3 + \binom{5}{3} (.75)^3 (.25)^2$$
$$= .0146 + .0879 + .2637 = \underline{\underline{.3662}}$$

- c. More than 3 thefts are attributed to the need to buy drugs.

$$P(X > 3) = \binom{5}{4} (.75)^4 (.25) + \binom{5}{5} (.75)^5$$
$$= .3955 + .2373 = \underline{\underline{.6328}}$$

NOTE

$P(X \leq 3) + P(X > 3) = 1$
Does that make sense?

2. (2 points) The amount of coffee dispensed on the USS BEANBUZZ is a random variable X having a continuous uniform distribution with $100 \leq X \leq 160$. What is the probability that coffee consumption on the BEANBUZZ is:

- a. Exactly 125 liters?

$$P(X=125) = \underline{\underline{0}}$$

I.E. $P = \int_{x_1}^{x_2} \frac{1}{B-A} dx$

$$= \int_{125}^{125} \frac{1}{60} dx = 0$$

- b. Between 113 and 132 liters?

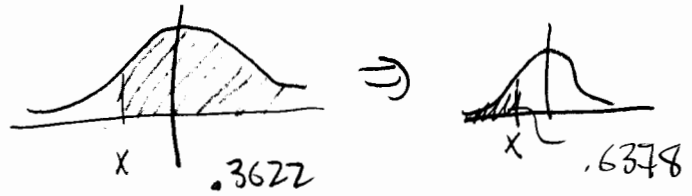
$$P(113 \leq X \leq 132) = \int_{113}^{132} \left(\frac{1}{60}\right) dx = \frac{132-113}{60} = \frac{19}{60}$$
$$\approx \underline{\underline{.3167}}$$

3. (3 points) Find the value of z if the area under a standard normal curve:

a. to the right of z is .3622;

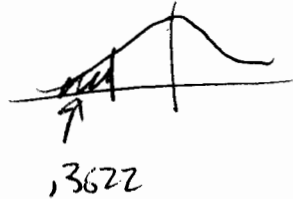
USE TABLE A.3

$$z \approx .355$$



b. to the left of z is .3622;

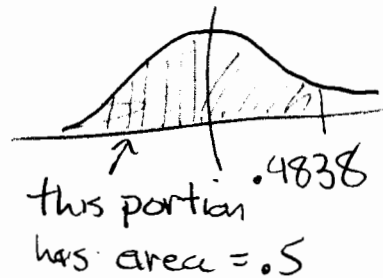
$$z \approx -.355$$



c. between 0 and z , with $z > 0$, is .4838.

Entire area left of z
will equal .9838

$$\Rightarrow z \approx 2.14$$

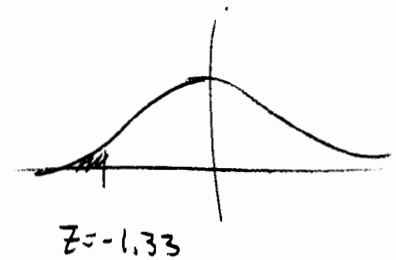


4. (2 points) Given a normal distribution with $\mu = 30$ and $\sigma = 6$, find normal curve area

a. to the left of $x = 22$;

$$\text{normalize: } z = \frac{22-30}{6} \approx -1.333$$

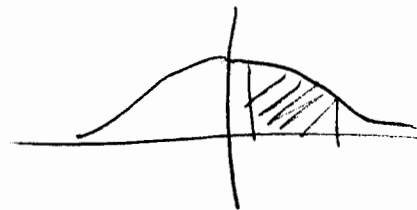
$$\therefore \underline{\underline{\Pr(X \leq 22) \approx .0913}}$$



b. between $x = 32$ and $x = 41$.

$$z_1 = \frac{32-30}{6} = .3333$$

$$z_2 = \frac{41-30}{6} = \frac{11}{6} = 1.833$$



$$P(.3333 \leq z_1 \leq 1.833) \approx .9666 - .6306 \approx \underline{\underline{.336}}$$