$\boxed{15G}$ #4 (a) $E(X) = (10)\left(\frac{1}{6}\right) = \frac{5}{3} = \mu$

(b) $Var(X) = (10)\left(\frac{1}{6}\right)\left(\frac{5}{6}\right) = \frac{25}{18}$

(c) $P(X < \mu) = P(X < 5/3)$

$= P(X=0) + P(X=1)$

$= \binom{10}{0}\left(\frac{1}{6}\right)^0\left(\frac{5}{6}\right)^{10} + \binom{10}{1}\left(\frac{1}{6}\right)^1\left(\frac{5}{6}\right)^9$

OR binomialcdf(10, 1/6, 1)

$= 0.485$

$\boxed{15J}$ <u>#2</u> $N(4, 0.25^2)$ X = bolt width

$P(3.5 < X < 4.5) = P(-2 < Z < 2)$

$= \text{normalcdf}(-2, 2)$

$= 0.954$

$Z = \frac{3.5-4}{0.25} = -2$

$Z = \frac{4.5-4}{0.25} = 2$

$0.954(500)$

$=$ <u>477 bolts</u>

The Inverse Normal

Ex. $\boxed{15J \# 2^*}$ $X \sim N(4, 0.25^2)$

What is the minimum diameter of a bolt whose width is in the top 10% of widths?

To rephrase: What diameter has a z-score that is 90% or better?

$$z = \text{invnorm}(0.90) = 1.28$$

$$z = \frac{x - \mu}{\sigma}$$

$$1.28 = \frac{x - 4}{0.25}$$

$$\boxed{4.32\text{mm}}$$

$$0.32 = x - 4$$

$$4.32 = x$$

What the largest diameter of a bolt in the bottom 25%?

$$z = \text{invnorm}(0.25) = -0.674 = \frac{x-4}{0.25}$$

$$\boxed{x = 3.83\text{mm}}$$

$\boxed{13L}$ **#4** $X \sim N(550, 25^2)$

(a) $z = \dfrac{520 - 550}{25} = -1.2$

$z = \dfrac{570 - 550}{25} = 0.8$

$P(520 < X < 570) = P(-1.2 < z < 0.8) = 0.673$

(b) $z = \text{invnorm}(0.90) = 1.28 = \dfrac{x - 550}{25}$

$\boxed{x = 582\,g}$

Ex. Rutabagas have mean weight of 32 oz. 15% of rutabagas weigh over 39 oz. Find σ.

$z = \text{invnorm}(0.85) = 1.036 = \dfrac{39 - 32}{\sigma}$

$\sigma = \dfrac{39 - 32}{1.036}$

$\boxed{\sigma = 6.76 \text{ oz.}}$

Ex: • 12% of cabbages weigh 14oz or less.

• 5% of cabbages weigh 24oz or more.

Find the $\overset{\mu}{\underline{\text{mean}}}$ and $\overset{\sigma}{\underline{\text{standard deviation}}}$ of the weights.

$$z = \frac{x-\mu}{\sigma}$$

$$z = \text{invnorm}(0.12) = -1.175 = \frac{14-\mu}{\sigma}$$

$$z = \text{invnorm}(0.95) = 1.645 = \frac{24-\mu}{\sigma}$$

$$\begin{cases} -1.175\sigma + \mu = 14 \\ 1.645\sigma + \mu = 24 \end{cases}$$

$$-2.82\sigma = -10$$

$$\boxed{\sigma = 3.55\text{oz}}$$

$$1.645(3.55) + \mu = 24$$

$$\boxed{\mu = 18.2\text{oz}}$$

H.W.

$\boxed{15J}$ # 5

$\boxed{15M}$ # 5, 7, 9, 10

Probability Distributions

Ex. X has this distribution

X	0	1	2	3
$P(X=x)$	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$

The Mean

$$\mu = E(X) = \frac{1}{10}(0) + \frac{2}{10}(1) + \frac{3}{10}(2) + \frac{4}{10}(3) = 2$$

$$\boxed{E(X) = \sum x \cdot P(X=x)}$$

The Variance

$$\sigma^2 = Var(X) = E(X^2) - [E(X)]^2$$

$$E(X^2) = \frac{1}{10}(0^2) + \frac{2}{10}(1^2) + \frac{3}{10}(2^2) + \frac{4}{10}(3^2)$$

$$= 5$$

$$Var(X) = 5 - [2]^2 = 1$$