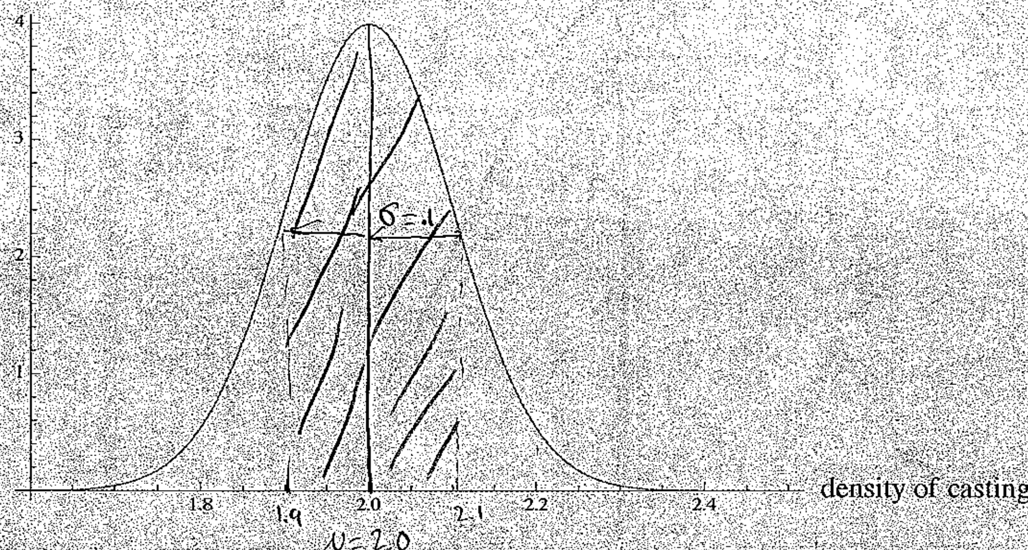
Phong Pham
STT-200
Sect 202

**Bonus Quiz 7-19-10**

**1. Metal castings have a density x that is normal (bell) distributed with a mean of 2 and a standard deviation of 0.1.**

**a. Sketch the density and label the mean and standard deviation as recognizable elements of your sketch.**




**b. Give a 68% interval for casting density and identify it by shading an area under curve (a).**

$\mu \pm \sigma \Rightarrow x = 2 \pm .1 \rightarrow \boxed{x = 1.9 \quad x = 2.1}$

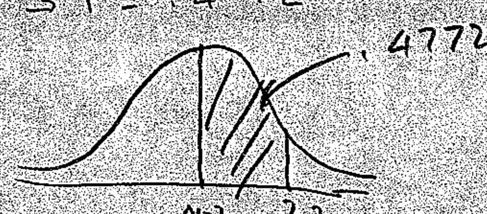
Lower Higher

**c. Determine the standard score z of a casting whose density is 2.2.**

$$z = \frac{2.2 - 2}{.1} = 2$$

**d. Give the area under curve (a) left of 2.2. Be sure to identify the relevant z-score.**

$$z = \frac{2.2 - 2}{.1} = 2 \rightarrow P = .4772$$

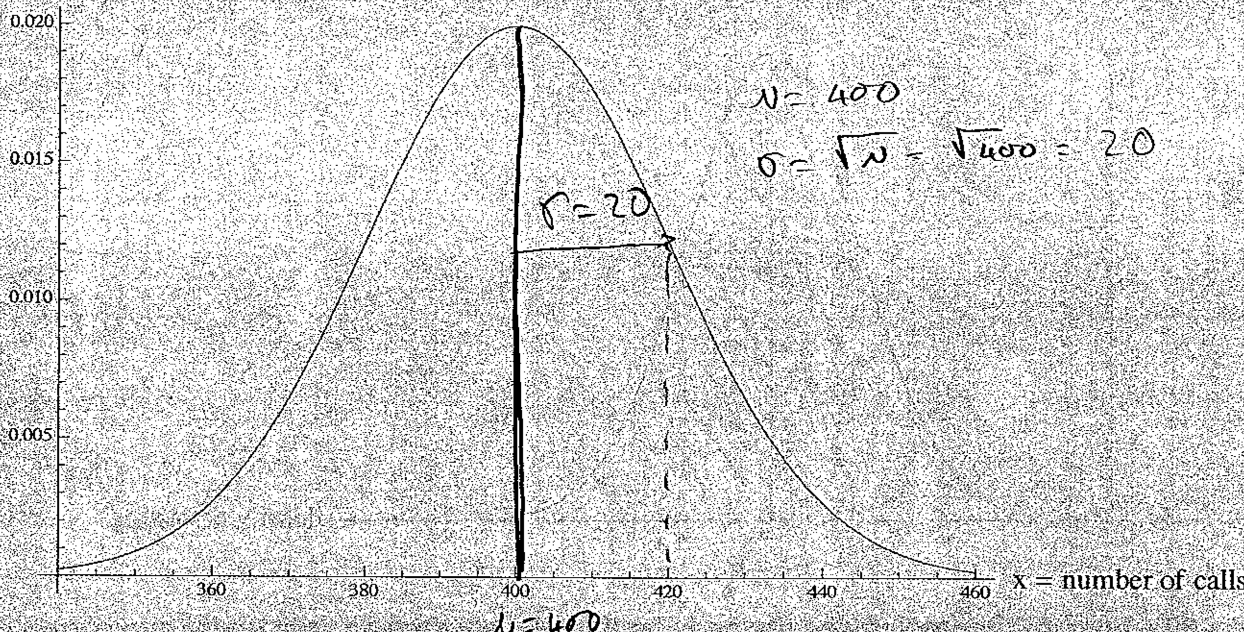



We want to the left

$\rightarrow P = .5 + .4772 = \boxed{.9772}$

**2.** **A Poisson distribution whose mean $\mu$ is at least 10 is fairly well approximated by a normal distribution having that mean and a standard deviation of $\sqrt{\mu}$. The distribution of the number of calls to emergency services in Fall semester is thought to follow the Poisson distribution with mean $\mu = 400$.**

**a. Sketch the *approximate* density and label the mean and standard deviation as recognizable elements of your sketch.**




**b. Give a 95% interval for the number of automobiles entering.**

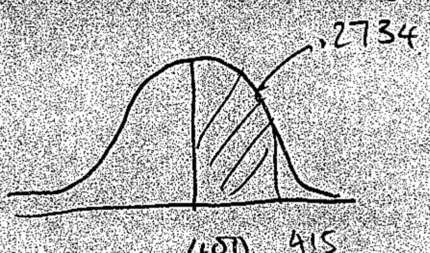
$\mu \pm 1.96\sigma \Rightarrow x = 400 - 1.96(20) = \boxed{360.8}$ lower

$x = 400 + 1.96(20) = \boxed{439.2}$ Higher

**c. Determine the standard score z of x = 415.**

$z = \dfrac{415 - 400}{20} = .75$

**d. Use (c) and the table of page 210 (Normal Curve Areas) to ascertain the probability of having more than 415 calls during Fall semester.**




$z = .75 \to P = .2734$

We want


$P = .5 - .2734 = \boxed{.2266}$

3. The binomial distribution with n and p satisfying
"np and n(1-p) are each at least 10"
is satisfactorily approximated by a normal distribution having mean np and standard deviation $\sqrt{np(1-p)}$. The probability that any given vending machine purchase is for product B4 is 0.1. We independently sample 200 purchases. Let X be the number of B4 purchases among these 200 purchases.

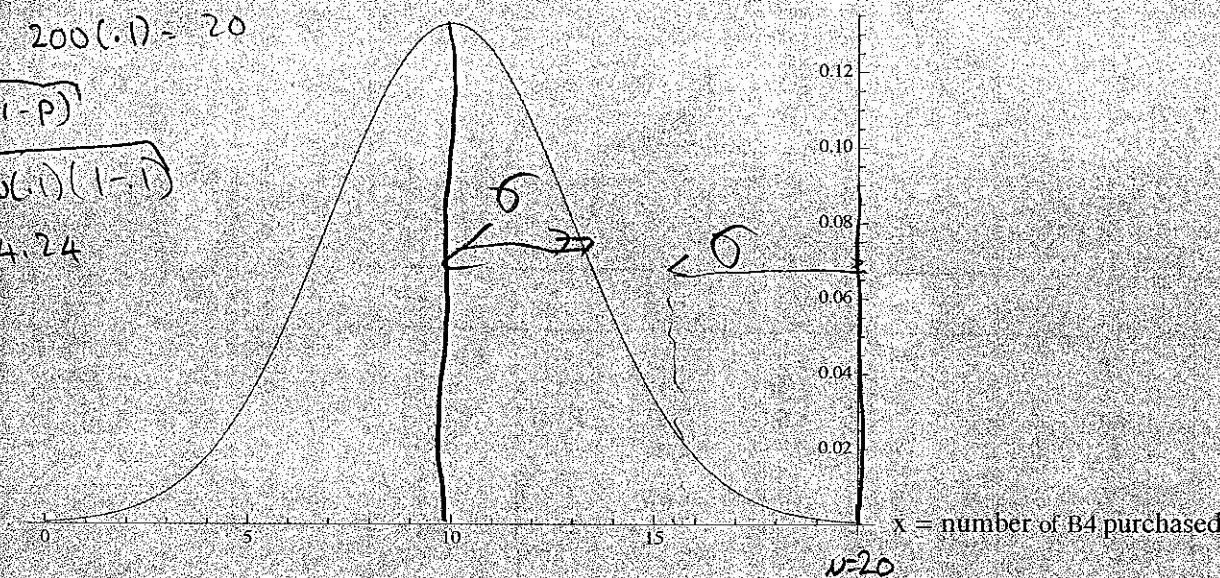
a. Sketch the *approximate* density and label the mean and standard deviation of X as recognizable elements of your sketch.

$\mu = np = 200(.1) = 20$

$\sigma = \sqrt{np(1-p)}$

$= \sqrt{200(.1)(1-.1)}$

$= 4.24$




a. Determine the mean and standard deviation of X by formula.

$\mu = np = 200(.1) = 20$

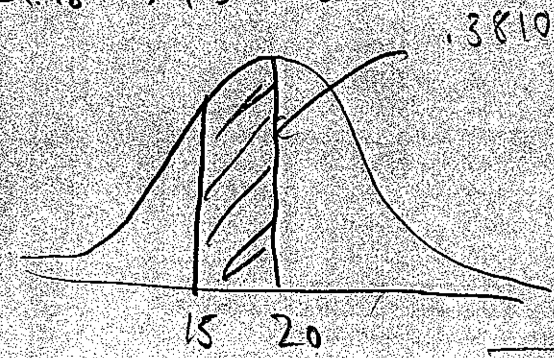
$\sigma = \sqrt{200(.1)(1-.1)} = 4.24$

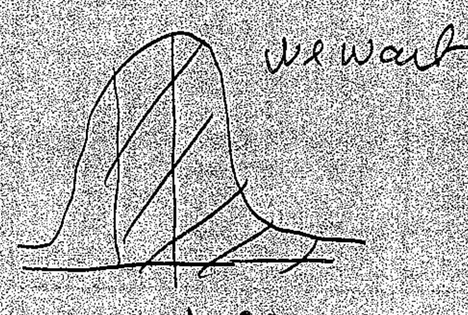
b. Use (a) to determine the standrd score of x = 15.

$$z = \frac{15-20}{4.24} = -1.18$$

c. Use (b) and the table of page 210 (Normal Curve Areas) to ascertain the probability of having more than 15 purchases of B4 (i.e. customers fail to find the product since the machine holds only 15).

$z = -1.18 \rightarrow P = .3810$




$P = .3810 + .5 = \boxed{.8810}$