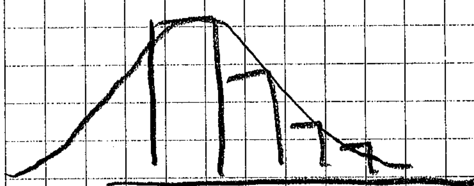
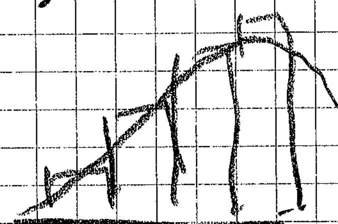
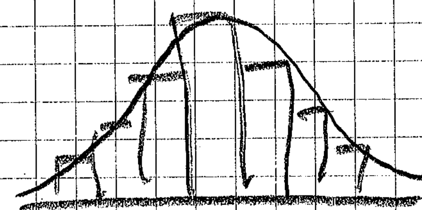
THE NORMAL APPROXIMATION TO THE BINOMIAL DISTRIBUTION

$$P(4 \leq x \leq 9) = P(4) + \cdots + P(9)$$

Example: Flipping a coin 1000 times

$$P(480 < X \leq 510)$$

$np \geq 5$, $nq \geq 5$ | $np \geq 10$, $nq \geq 10$ | $np \geq 15$, $nq \geq 15$

$n = 1000$
$p = .5$

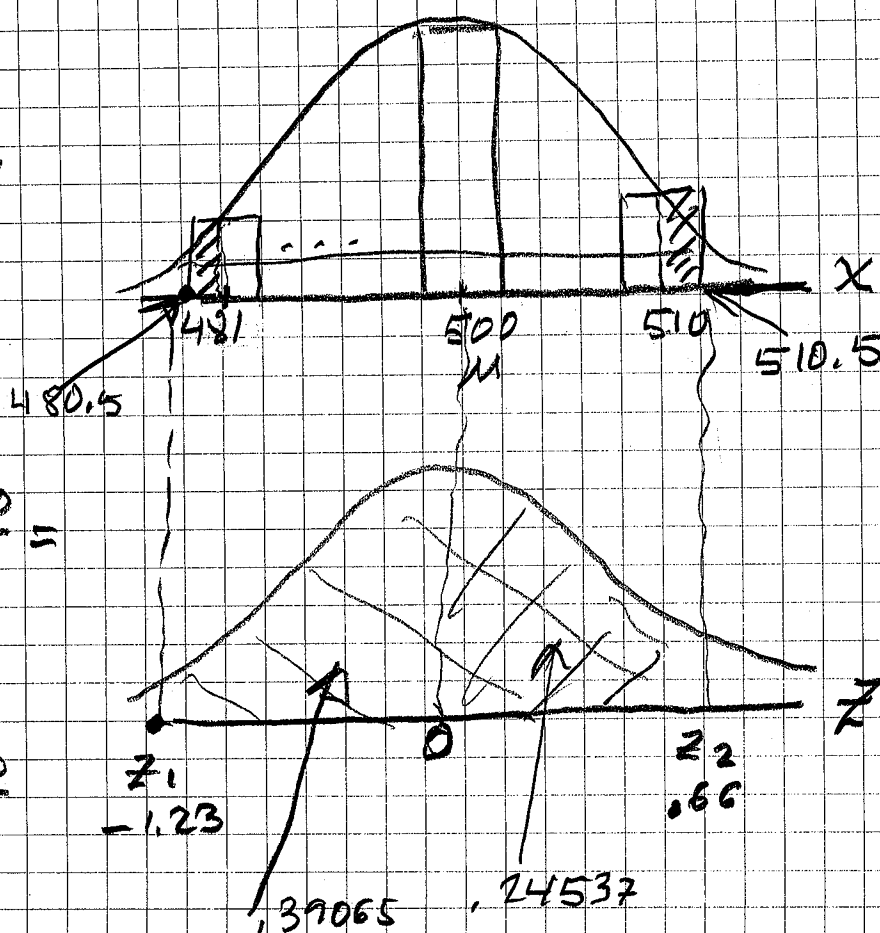
$np = 1000 \times .5 = 500$
$nq = \qquad = 500$

For the Binomial

$$\mu = np \quad = 1000 \times .5 = 500$$

$$\sigma = \sqrt{n \cdot pq} = \sqrt{1000 \times .5 \times .5} = 15.8$$

Correction for continuity



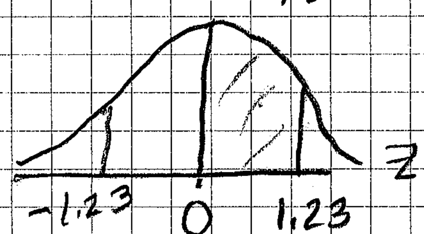
$$Z = \frac{x-\mu}{\sigma}$$

$$Z_1 = \frac{480.5-500}{15.8} =$$

$$= -1.23$$

$$Z_2 = \frac{510.5-500}{15.8}$$

$$= .66$$



$$P(480 < X \leq 510) = .39065 + .24537$$

$$= .63608$$

$$.74667 - .12098$$

$$= .62569$$