Q. 45% of people having blood group A
random sample of 300 individuals
are chosen from population
prob of more than 115 of sample of group A

$np_q$
$135 \times 0.55$

$X \sim Bin(300, 0.45) \sim N(135, 74.25)$

$P(X > 115)$ or $P(X > 115.5)$

$= P\left(Z > \frac{115.5 - 135}{\sqrt{74.25}}\right)$

$= P(Z > -2.263)$

$= 0.48809.$

Q Consider a random sample of size 16 taken from a normal distribution with mean $\mu = 25$ and variance $\sigma^2 = 4$. Let the sample mean be denoted by $\bar{x}$

State the distribution of $\bar{X}$ and hence the probability that $\bar{X}$ assumes a value greater than 26.

$\bar{x} \sim N(\mu, \sigma^2/n)$

$$\bar{x} \sim N\left(\mu, \sigma^2/n\right)$$

$$P(\bar{x} > 26) = P\left[z > \frac{26-25}{2/\sqrt{16}}\right]$$

$$= P[z > 2]$$

Q A computer routine selects one of the integers 1, 2, 3, 4, 5 at random & replicates the process a total of 100 times. Let S denote the sum of the 100 numbers selected. Calculate the approximate probability that S assumes a value between 280 and 320 (inclusive)

we have the sum of 100 discrete uniform random variables $X_i$ $(i = 1, 2, \ldots, 100)$.

$a = 1$ and $b = 5$.

and $f(x) = 1/5$ for $x = 1, 2, 3, \ldots 5$

$$E(x_i) = \frac{\cancel{1+5}}{2} = 3$$

$$V(x_i) = \frac{b^2 - a^2}{12} = \frac{5^2 - 1^2}{12} = \frac{25-1}{12} = \frac{24}{12} = 2$$

$$sd(x_i) = \sqrt{\frac{b^2 - a^2}{12}}$$

$$= 2$$

Central Limit Theorem:

$$S = \sum_{i=1}^{100} X_i \sim N(300, 200)$$

$$P[280 \le S \le 320] \approx P[279.5 < S < 320.5]$$

$$= P[S < 320.5] - P[S > 279.5]$$

$$= P\left[Z < \frac{320.5 - 300}{\sqrt{200}}\right] - P\left[Z > \frac{279.5 - 300}{\sqrt{200}}\right]$$

$$= P(Z < 1.44957) - P[Z > -1.44957]$$

$$= P(Z < 1.44957) - [1 - P(Z < 1.44957)]$$

$$= 2P(Z < 1.44957) - 1$$

$$= 2 \times 0.92641 - 1$$

$$= 0.85282$$

**Q** Let $Y = X_1 + X_2 + \cdots + X_{15}$ be the sum of a random sample of size 15 from the distribution whose density fn is

$$f(x) = \begin{cases} \frac{3}{2}x^2 & \text{if } -1 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

What is the approximate value of

$$P(-0.3 \le Y \le 1.5)$$

What is the approximate ... of

$$P(-0.3 \le Y \le 1.5)$$

when one uses the central limit theorem.

$$\mu = \int_{-1}^{1} \frac{3}{2} x^2 \cdot x\,dx = \int_{-1}^{1} \frac{3}{2} x^3\,dx = \frac{3}{2}\left[\frac{x^4}{4}\right]_{-1}^{1}$$

$$= 0$$

$$\text{var}(x) = E(x^2) - E(x)^2$$

$$\sigma^2 = 0.6$$

$$P(-0.3 \le Y \le 1.5) = P\left(\frac{-0.3}{\sqrt{15 \times 0.6}} \le \frac{Y}{\sqrt{15 \times 0.6}} \le \frac{1.5}{\sqrt{15 \times 0.6}}\right)$$

$$= P(-0.10 \le Z \le 0.50)$$

$$= P(Z \le 0.50) + P(Z \le 0.10) - 1$$

$$= 0.6915 + 0.5398 - 1$$

$$= 0.2313$$

TRY: Q Light Bulbs are installed successively into a socket. If we assume that each light bulb has a mean life of 2 months with a s.d. of 0.25 months, what is the probability that 40 bulbs last at least 7 years?

Q Indian Airlines claims that the average no. of ... flight movies, when plane

Q Indian Airlines claims that the average no. of people who pay for in-flight movies, when plane is fully loaded is 42 with a s.d. of 8

A sample of 36 fully loaded planes is taken. What is the probability that fewer than 38 people paid for in flight movies.