

## 11.2: Facts About the Chi-Square Distribution

The notation for the **chi-square distribution** is:

$$\chi \sim \chi_{df}^2$$

where  $df$  = degrees of freedom which depends on how chi-square is being used. (If you want to practice calculating chi-square probabilities then use  $df = n - 1$ . The degrees of freedom for the three major uses are each calculated differently.)

For the  $\chi^2$  distribution, the population mean is  $\mu = df$  and the population standard deviation is  $\sigma = \sqrt{2(df)}$ .

The random variable is shown as  $\chi^2$ .

The random variable for a chi-square distribution with  $k$  degrees of freedom is the sum of  $k$  independent, squared standard normal variables.

$$\chi^2 = (Z_1)^2 + (Z_2)^2 + \dots + (Z_k)^2$$

1. The curve is non-symmetrical and skewed to the right.
2. There is a different chi-square curve for each  $df$  (11.2.1).
3. The test statistic for any test is always greater than or equal to zero.
4. When  $df > 90$ , the chi-square curve approximates the normal distribution. For  $\chi \sim \chi_{1,000}^2$  the mean,  $\mu = df = 1,000$  and the standard deviation,  $\sigma = \sqrt{2(1,000)} = 44.7$ . Therefore,  $\chi \sim N(1,000, 44.7)$ , approximately.
5. The mean,  $\mu$ , is located just to the right of the peak.

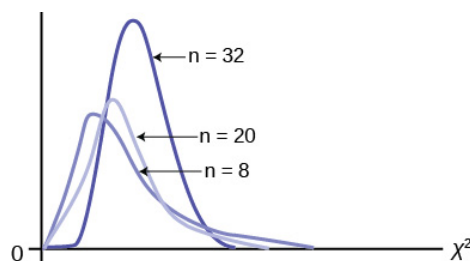


Figure 11.2.1

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