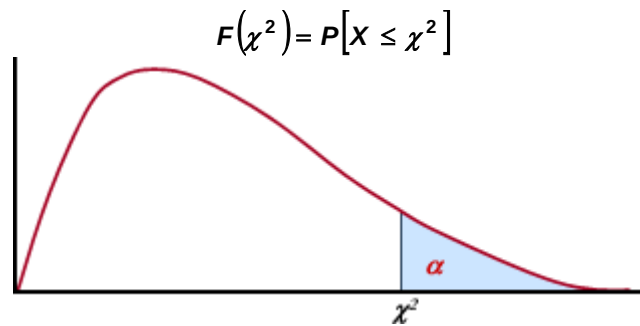


# VALUES OF THE CHI-SQUARE DISTRIBUTION



10 degrees of freedom and  $\alpha=0.05$   $\longrightarrow$   $P[X \leq 18.3] = 0.95$

| Degrees of freedom | df \ 1 - $\alpha$ | 0.005     | 0.010    | 0.025    | 0.050   | 0.100  | 0.250 | 0.500 | 0.750 | 0.900 | 0.950 | 0.975 |
|--------------------|-------------------|-----------|----------|----------|---------|--------|-------|-------|-------|-------|-------|-------|
|                    | 1                 | 0.0000393 | 0.000157 | 0.000982 | 0.00393 | 0.0158 | 0.102 | 0.455 | 1.32  | 2.71  | 3.84  | 5.02  |
|                    | 2                 | 0.0100    | 0.0201   | 0.0506   | 0.103   | 0.211  | 0.575 | 1.39  | 2.77  | 4.61  | 5.99  | 7.38  |
|                    | 3                 | 0.0717    | 0.115    | 0.216    | 0.352   | 0.584  | 1.21  | 2.37  | 4.11  | 6.25  | 7.81  | 9.35  |
|                    | 4                 | 0.207     | 0.297    | 0.484    | 0.711   | 1.06   | 1.92  | 3.36  | 5.39  | 7.78  | 9.49  | 11.1  |
|                    | 5                 | 0.412     | 0.554    | 0.831    | 1.15    | 1.61   | 2.67  | 4.35  | 6.63  | 9.24  | 11.1  | 12.8  |
|                    | 6                 | 0.676     | 0.872    | 1.24     | 1.64    | 2.20   | 3.45  | 5.35  | 7.84  | 10.6  | 12.6  | 14.4  |
|                    | 7                 | 0.989     | 1.24     | 1.69     | 2.17    | 2.83   | 4.25  | 6.35  | 9.04  | 12.0  | 14.1  | 16.0  |
|                    | 8                 | 1.34      | 1.65     | 2.18     | 2.73    | 3.49   | 5.07  | 7.34  | 10.2  | 13.4  | 15.5  | 17.5  |
|                    | 9                 | 1.73      | 2.09     | 2.70     | 3.33    | 4.17   | 5.90  | 8.34  | 11.4  | 14.7  | 16.9  | 19.0  |
|                    | 10                | 2.16      | 2.56     | 3.25     | 3.94    | 4.87   | 6.74  | 9.34  | 12.5  | 16.0  | 18.3  | 20.5  |
|                    | 11                | 2.60      | 3.05     | 3.82     | 4.57    | 5.58   | 7.58  | 10.3  | 13.7  | 17.3  | 19.7  | 21.9  |
|                    | 12                | 3.07      | 3.57     | 4.40     | 5.23    | 6.30   | 8.44  | 11.3  | 14.8  | 18.5  | 21.0  | 23.3  |

VALUES OF THE CHI-SQUARE DISTRIBUTION

$$F(\chi^2) = P[X \leq \chi^2]$$

| df \ 1 - $\alpha$ | 0.005     | 0.010    | 0.025    | 0.050   | 0.100  | 0.250 | 0.500 | 0.750 | 0.900 | 0.950 | 0.975 | 0.990 | 0.995 |
|-------------------|-----------|----------|----------|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1                 | 0.0000393 | 0.000157 | 0.000982 | 0.00393 | 0.0158 | 0.102 | 0.455 | 1.32  | 2.71  | 3.84  | 5.02  | 6.63  | 7.88  |
| 2                 | 0.0100    | 0.0201   | 0.0506   | 0.103   | 0.211  | 0.575 | 1.39  | 2.77  | 4.61  | 5.99  | 7.38  | 9.21  | 10.6  |
| 3                 | 0.0717    | 0.115    | 0.216    | 0.352   | 0.584  | 1.21  | 2.37  | 4.11  | 6.25  | 7.81  | 9.35  | 11.3  | 12.8  |
| 4                 | 0.207     | 0.297    | 0.484    | 0.711   | 1.06   | 1.92  | 3.36  | 5.39  | 7.78  | 9.49  | 11.1  | 13.3  | 14.9  |
| 5                 | 0.412     | 0.554    | 0.831    | 1.15    | 1.61   | 2.67  | 4.35  | 6.63  | 9.24  | 11.1  | 12.8  | 15.1  | 16.7  |
| 6                 | 0.676     | 0.872    | 1.24     | 1.64    | 2.20   | 3.45  | 5.35  | 7.84  | 10.6  | 12.6  | 14.4  | 16.8  | 18.5  |
| 7                 | 0.989     | 1.24     | 1.69     | 2.17    | 2.83   | 4.25  | 6.35  | 9.04  | 12.0  | 14.1  | 16.0  | 18.5  | 20.3  |
| 8                 | 1.34      | 1.65     | 2.18     | 2.73    | 3.49   | 5.07  | 7.34  | 10.2  | 13.4  | 15.5  | 17.5  | 20.1  | 22.0  |
| 9                 | 1.73      | 2.09     | 2.70     | 3.33    | 4.17   | 5.90  | 8.34  | 11.4  | 14.7  | 16.9  | 19.0  | 21.7  | 23.6  |
| 10                | 2.16      | 2.56     | 3.25     | 3.94    | 4.87   | 6.74  | 9.34  | 12.5  | 16.0  | 18.3  | 20.5  | 23.2  | 25.2  |
| 11                | 2.60      | 3.05     | 3.82     | 4.57    | 5.58   | 7.58  | 10.3  | 13.7  | 17.3  | 19.7  | 21.9  | 24.7  | 26.8  |
| 12                | 3.07      | 3.57     | 4.40     | 5.23    | 6.30   | 8.44  | 11.3  | 14.8  | 18.5  | 21.0  | 23.3  | 26.2  | 28.3  |
| 13                | 3.57      | 4.11     | 5.01     | 5.89    | 7.04   | 9.30  | 12.3  | 16.0  | 19.8  | 22.4  | 24.7  | 27.7  | 29.8  |
| 14                | 4.07      | 4.66     | 5.63     | 6.57    | 7.79   | 10.2  | 13.3  | 17.1  | 21.1  | 23.7  | 26.1  | 29.1  | 31.3  |
| 15                | 4.60      | 5.23     | 6.26     | 7.26    | 8.55   | 11.0  | 14.3  | 18.2  | 22.3  | 25.0  | 27.5  | 30.6  | 32.8  |
| 16                | 5.14      | 5.81     | 6.91     | 7.96    | 9.31   | 11.9  | 15.3  | 19.4  | 23.5  | 26.3  | 28.8  | 32.0  | 34.3  |
| 17                | 5.70      | 6.41     | 7.56     | 8.67    | 10.1   | 12.8  | 16.3  | 20.5  | 24.8  | 27.6  | 30.2  | 33.4  | 35.7  |
| 18                | 6.26      | 7.01     | 8.23     | 9.39    | 10.9   | 13.7  | 17.3  | 21.6  | 26.0  | 28.9  | 31.5  | 34.8  | 37.2  |
| 19                | 6.84      | 7.63     | 8.91     | 10.1    | 11.7   | 14.6  | 18.3  | 22.7  | 27.2  | 30.1  | 32.9  | 36.2  | 38.6  |
| 20                | 7.43      | 8.26     | 9.59     | 10.9    | 12.4   | 15.5  | 19.3  | 23.8  | 28.4  | 31.4  | 34.2  | 37.6  | 40.0  |
| 21                | 8.03      | 8.90     | 10.3     | 11.6    | 13.2   | 16.3  | 20.3  | 24.9  | 29.6  | 32.7  | 35.5  | 38.9  | 41.4  |
| 22                | 8.64      | 9.54     | 11.0     | 12.3    | 14.0   | 17.2  | 21.3  | 26.0  | 30.8  | 33.9  | 36.8  | 40.3  | 42.8  |
| 23                | 9.26      | 10.2     | 11.7     | 13.1    | 14.8   | 18.1  | 22.3  | 27.1  | 32.0  | 35.2  | 38.1  | 41.6  | 44.2  |
| 24                | 9.89      | 10.9     | 12.4     | 13.8    | 15.7   | 19.0  | 23.3  | 28.2  | 33.2  | 36.4  | 39.4  | 43.0  | 45.6  |
| 25                | 10.5      | 11.5     | 13.1     | 14.6    | 16.5   | 19.9  | 24.3  | 29.3  | 34.4  | 37.7  | 40.6  | 44.3  | 46.9  |
| 26                | 11.2      | 12.2     | 13.8     | 15.4    | 17.3   | 20.8  | 25.3  | 30.4  | 35.6  | 38.9  | 41.9  | 45.6  | 48.3  |
| 27                | 11.8      | 12.9     | 14.6     | 16.2    | 18.1   | 21.7  | 26.3  | 31.5  | 36.7  | 40.1  | 43.2  | 47.0  | 49.6  |
| 28                | 12.5      | 13.6     | 15.3     | 16.9    | 18.9   | 22.7  | 27.3  | 32.6  | 37.9  | 41.3  | 44.5  | 48.3  | 51.0  |
| 29                | 13.1      | 14.3     | 16.0     | 17.7    | 19.8   | 23.6  | 28.3  | 33.7  | 39.1  | 42.6  | 45.7  | 49.6  | 52.3  |
| 30                | 13.8      | 15.0     | 16.8     | 18.5    | 20.6   | 24.5  | 29.3  | 34.8  | 40.3  | 43.8  | 47.0  | 50.9  | 53.7  |