AC_Distribution Fitting

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Normal Distribution:

```
library(matlib)
library(pracma)
```

```
##
## Attaching package: 'pracma'

## The following objects are masked from 'package:matlib':
##
##     angle, inv
```

Question:

Answer:

```
class_int <- seq(70, 140, 10)
class <- c("70-80", "80-90", "90-100", "100-110", "110-120", "120-130", "130-140")
f <- c(22, 48, 72, 104, 86, 49, 30)
x <- seq(75, 135, 10)
```

```
x_bar <- dot(f, x)/(sum(f))
x_bar
```

```
## [1] 105.9732
```

```
st_var <- sum(((x - x_bar)**2)*f)/(sum(f) - 1)
st_var
```

```
## [1] 246.3676
```

```
st_dev <- sqrt(st_var)
```

Here, $\hat{\mu} = 105.97, \hat{\sigma^2} = 246.37$.

```
p <- c((pnorm(80, x_bar, st_dev)-pnorm(70, x_bar, st_dev)),
       (pnorm(90, x_bar, st_dev)-pnorm(80, x_bar, st_dev)),
       (pnorm(100, x_bar, st_dev)-pnorm(90, x_bar, st_dev)),
       (pnorm(110, x_bar, st_dev)-pnorm(100, x_bar, st_dev)),
       (pnorm(120, x_bar, st_dev)-pnorm(110, x_bar, st_dev)),
       (pnorm(130, x_bar, st_dev)-pnorm(120, x_bar, st_dev)),
       (pnorm(140, x_bar, st_dev)-pnorm(130, x_bar, st_dev)))
p
```

```
## [1] 0.03802996 0.10543378 0.19734593 0.24946859 0.21300927 0.12283963 0.04783081
```

Expected frequency:

```
exp_freq <- p*sum(f)
exp_freq
```

```
## [1]  15.63031  43.33328  81.10918 102.53159  87.54681  50.48709  19.65846
```

Goodness of fit:

```
df <- data.frame(class, f, exp_freq, p)
colnames(df) <- c("Class_Intervals", "Observed_Frequency", "Expected_Frequency", "Probability")
df
```

```
##   Class_Intervals Observed_Frequency Expected_Frequency Probability
## 1           70-80                 22           15.63031  0.03802996
## 2           80-90                 48           43.33328  0.10543378
## 3          90-100                 72           81.10918  0.19734593
## 4         100-110                104          102.53159  0.24946859
## 5         110-120                 86           87.54681  0.21300927
## 6         120-130                 49           50.48709  0.12283963
## 7         130-140                 30           19.65846  0.04783081
```

```
#Chi-square test statistic
#df = (k-1-r) = (7-1-2) = 4; k = no. of obs, r = no. of parameters
chi <- (f - exp_freq)**2/exp_freq
sum(chi)
```

```
## [1] 9.653822
```

```
qchisq(0.95, 4)
```

```
## [1] 9.487729
```