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#EE597
#HW13

#Pr.24.2 (Mean, median, standard deviation)

```
restart;
with(Statistics) :
Digits := 5 :
#define the samples
S := [4, 2, 4, 5, 3, 7, 5, 4];
```

$$S := [4, 2, 4, 5, 3, 7, 5, 4] \quad (1)$$

```
#define mean
xbar := Mean(S);
```

$$xbar := 4.2500 \quad (2)$$

```
#deine Median
?Median
mid := Median(S);
```

$$mid := 4. \quad (3)$$

```
#define Standard deviation
?StandardDeviation
SD := StandardDeviation(S);
```

$$SD := 1.4880 \quad (4)$$

#Pr.24.4 (Histogram, boxplot)

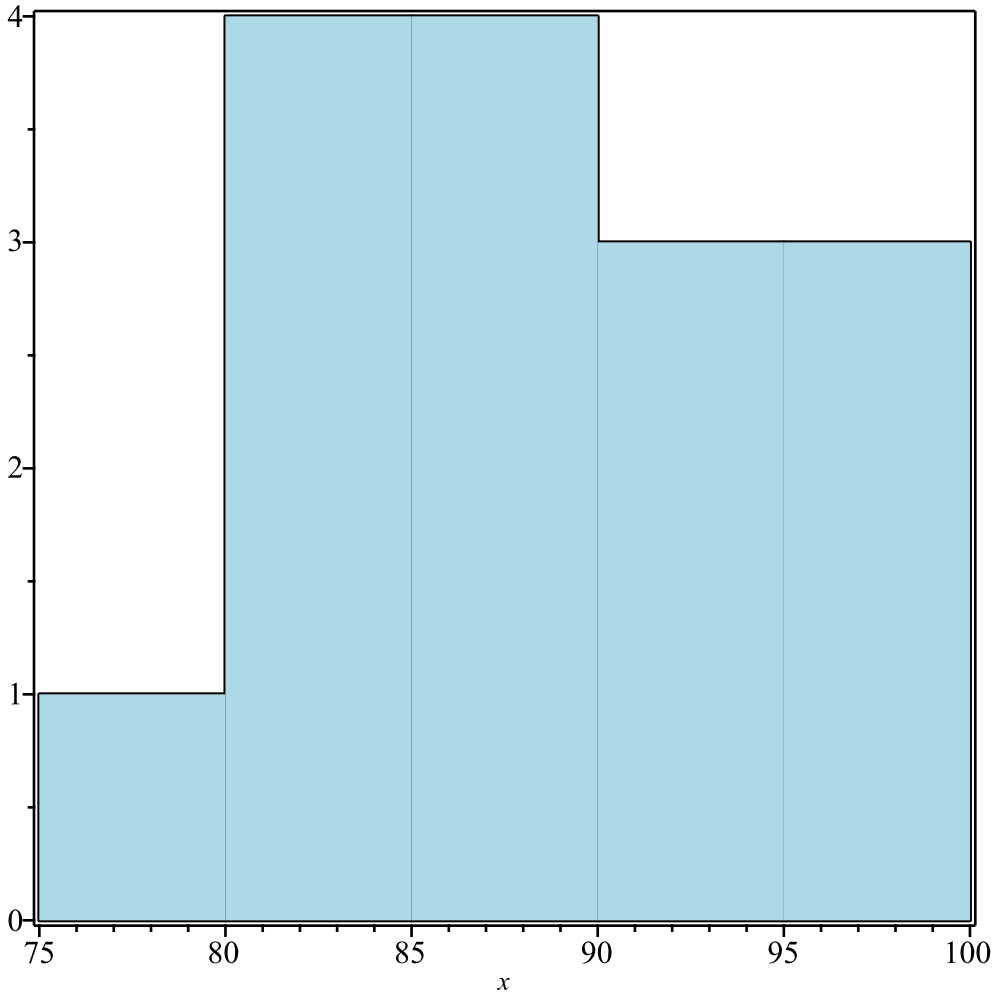
```
restart;
with(Statistics) :

 S := [90, 85, 97, 91, 80, 83, 98, 88, 78, 84, 82, 99, 86, 91, 85];
```

$$S := [90, 85, 97, 91, 80, 83, 98, 88, 78, 84, 82, 99, 86, 91, 85] \quad (5)$$

```
S := sort(%)
```

$$S := [78, 80, 82, 83, 84, 85, 85, 86, 88, 90, 91, 91, 97, 98, 99] \quad (6)$$

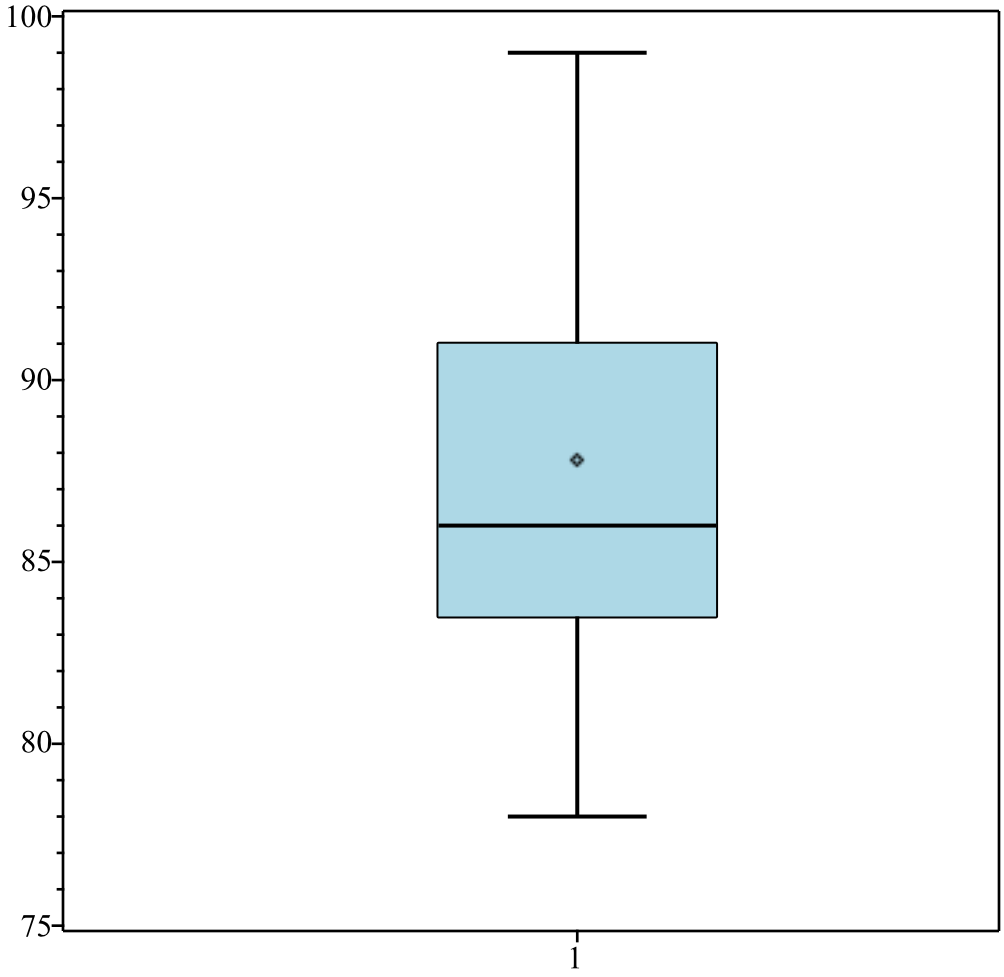
```
Histogram(S, binbounds = [75, 80, 85, 90, 95, 100],
   frequencyscale = absolute, labels = [x, ""], color = "LightBlue");
```



TallyInto(*S*, *Vector*([75, 80, 85, 90, 95, 100]));

[75. ..80. = 1, 80. ..85. = 4, 85. ..90. = 4, 90. ..95. = 3, 95. ..100. = 3] **(7)**

BoxPlot(*S*, *view* = [−1 ..1.5, 75 ..100], *color* = "LightBlue");



#Pr.24.6 (Probability)

```
restart;
with(Statistics) :
Digits := 5 :     # limits the number of digits of floating numbers to 5
Success := 0.95
```

$$Success := 0.95 \quad \textbf{(8)}$$

```
Prob_eq := (1 - p)^10 = Success;
```

$$Prob\_eq := (1-p)^{10} = 0.95 \quad \textbf{(9)}$$

```
?fsolve
 fsolve(Prob_eq, p, 0..1);
```

$$0.0051162 \quad \textbf{(10)}$$

#Pr.24.8 (Binomial distribution)

```
restart;
with(Statistics) :
 Digits := 5 :     # limits the number of digits of floating numbers to 5
n := 40;                          #number of trials
```

$$n := 40 \quad \textbf{(11)}$$

```
success := 0.5;          #Prob of success
```

$$success := 0.5 \quad \textbf{(12)}$$

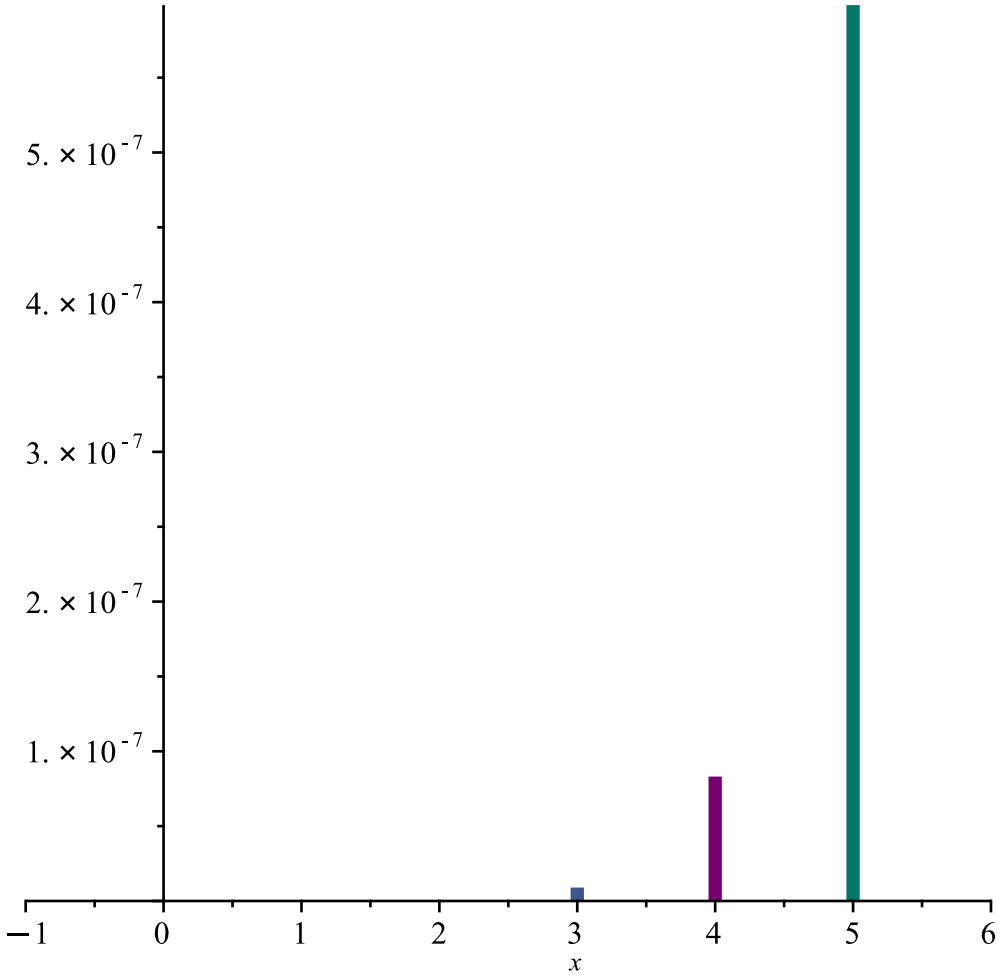
```
f := seq(ProbabilityFunction('Binomial'(n, success), x), x = 0 ..n);
```

$$f := 9.0949 \times 10^{-13}, 3.6380 \times 10^{-11}, 7.0941 \times 10^{-10}, 8.9859 \times 10^{-9}, 8.3120 \times 10^{-8}, 5.9847 \times 10^{-7}, 3.4910 \times 10^{-6}, 0.000016958, 0.000069944, 0.00024869, 0.00077094, 0.0021025, 0.0050813, 0.010944, 0.021106, 0.036585, 0.057165, 0.080702, 0.10312, 0.11940, 0.12537, 0.11940, 0.10312, 0.080704, 0.057165, 0.036585, 0.021107, 0.010944, 0.0050813, 0.0021025, 0.00077094, 0.00024869, 0.000069944, 0.000016957, 3.4911 \times 10^{-6}, 5.9847 \times 10^{-7}, 8.3119 \times 10^{-8}, 8.9859 \times 10^{-9}, 7.0940 \times 10^{-10}, 3.6380 \times 10^{-11}, 9.0949 \times 10^{-13} \quad \textbf{(13)}$$

```
s := seq([[j - 1, 0], [j - 1, f[j]]], j = 1 ..6);
```

$$s := [[0, 0], [0, 9.0949 \times 10^{-13}]], [[1, 0], [1, 3.6380 \times 10^{-11}]], [[2, 0], [2, 7.0941 \times 10^{-10}]], [[3, 0], [3, 8.9859 \times 10^{-9}]], [[4, 0], [4, 8.3120 \times 10^{-8}]], [[5, 0], [5, 5.9847 \times 10^{-7}]] \quad \textbf{(14)}$$

```
plot([s], x = -1 ..6, thickness = 5);
```



#Pr.24.14 (Normal distribution)

```
restart;
with(Statistics) :
```

$var := 36.0;$

$$var := 36.0 \tag{15}$$

#determine the standard deviation as sdev

$sdev := \mathrm{sqrt}(var);$

$$sdev := 6.000000000 \tag{16}$$

#defien the mean as xbar

$xbar := 116.0;$

$$xbar := 116.0 \tag{17}$$

#definea Normal Distribution for the given data

$X := RandomVariable(Normal(xbar, sdev));$

$$X := \_R0 \tag{18}$$

 # let P1 be the P(X<122.5) therefor P1 is in the left of the Mean t

$P1 := CDF(X, 122.5);$

$$P1 := 0.860669752550378 \tag{19}$$

 # let P2 be the P(X>110) therefor P2 is in the right of the Mean

$P2 := 1 - CDF(X, 110);$

$$P2 := 0.8413447460 \tag{20}$$

 # let P3 be the P(120.5<X<121.25) therefor P3 is difference between the prob at each given point

$P3 := CDF(X, 121.25) - CDF(X, 120.5);$

$$P3 := 0.0358403995243577 \tag{21}$$