1.

a. The number of data points = 11 The sum of data points is 506
so $\bar{x}$ = 506/11 = **46**

The sample size (n = 11) is odd, so there will be a middle value.
Sorting from smallest to largest: 5 5 22 30 33 37 40 58 74 83 119
Median is the middle value: the sixth one, **37**

The mean differs from the median because the largest sample observations are much further from the median than are the smallest values.

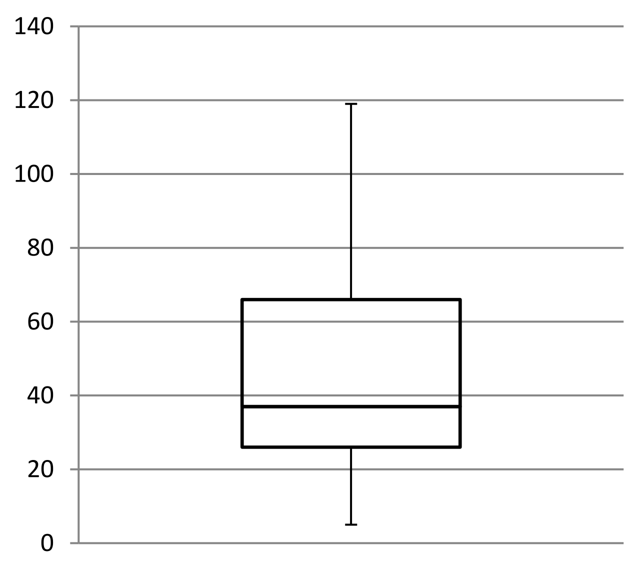
b. On average the quality meets the standard (46<100). However, this is not valid considering there is a case (119) that violates the standard

c. N=11, odd number: include the median in both halves
Q1 = the median of the lower half: 5 5 22 30 33 37 = (22+30)/2 = **26**
Q3= the median of the upper half: 37 40 58 74 83 119 = (58+74)/2 = **66**

f_s = IQR = Q3-Q1 = 66-26 = **40**

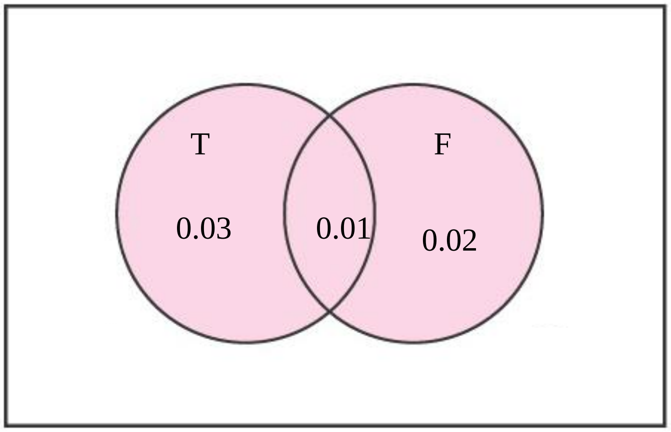
1.5*IQR = 60
Min = 5 (≥ 26-60)
Max = 119 (≤66+60)

d. No outliers

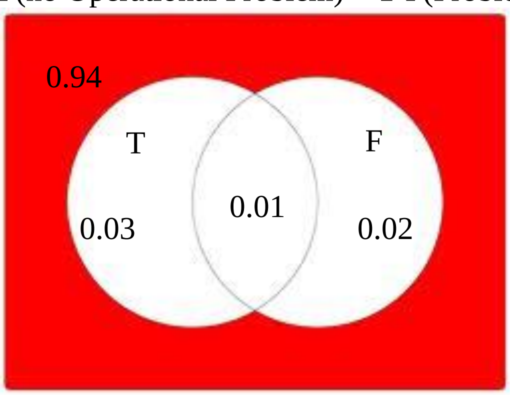


2.

a. $P(F)=0.03$, $P(T)=0.04$, $P(F\cap T)=0.01$
   $P(F\cup T) = P(F) + P(T) + P(F\cap T)= 0.03+0.04-0.01 =$ **0.06**

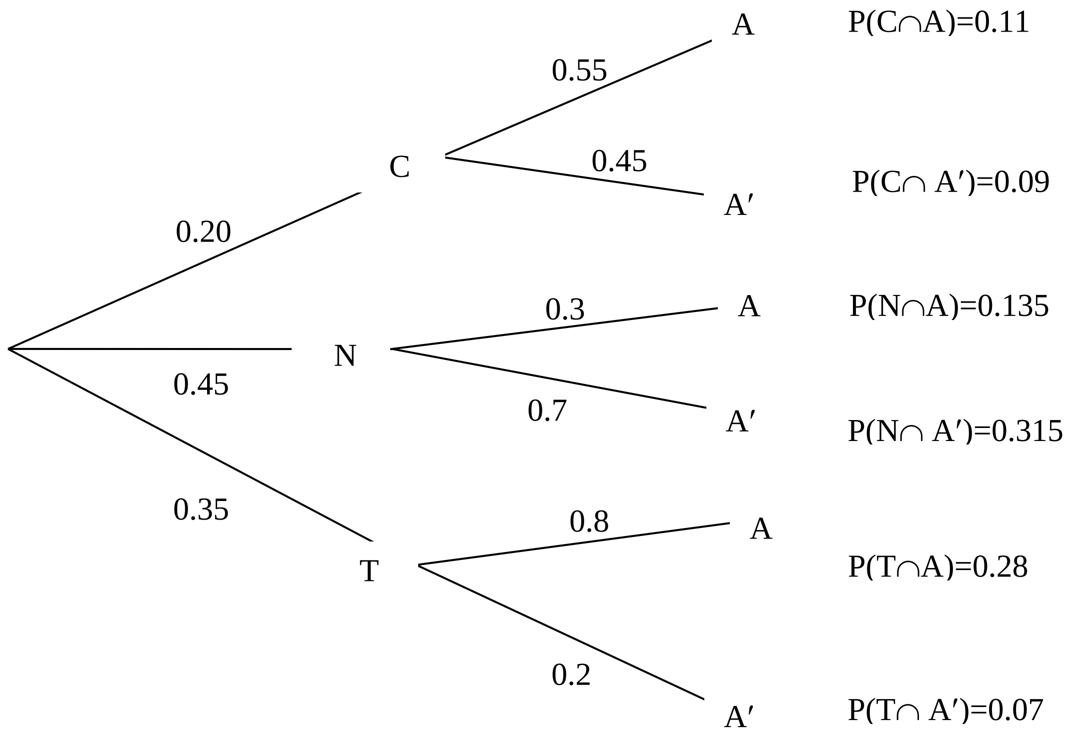


b. P(no Operational Problem) = 1-P(Problem)=1-0.06=**<u>0.94</u>**



c. $P(F|T)=\frac{P(F\cap T)}{P(T)} = \frac{0.01}{0.04} = 0.25$

3.
a.



$P(C) = 0.20$, $P(N) = 0.45$, $P(T) = 0.35$
$P(A|C) = 0.55$, $P(A|N) = 0.30$, $P(A|T) = 0.80$,

$P(C\cap A) = P(C)P(A|C) = 0.20\times 0.55 = 0.11$
$P(N\cap A) = P(N)P(A|N) = 0.45\times 0.30 = 0.135$
$P(T\cap A) = P(T)P(A|T) = 0.35\times 0.80 = 0.28$

$P(A) = P(C\cap A) + P(N\cap A) + P(T\cap A) = 0.11 + 0.135 + 0.28 =$ **<u>0.525</u>**

b. $P(C|A) = \frac{P(A|C)P(C)}{P(A)} = \frac{0.55\times 0.20}{0.525}$ or $\frac{P(C\cap A)}{P(A)} = \frac{0.11}{0.525} =$ **<u>0.21</u>**
$P(N|A) = \frac{P(A|N)P(N)}{P(A)} = \frac{0.30\times 0.45}{0.525}$ or $\frac{P(N\cap A)}{P(A)} = \frac{0.135}{0.525} =$ **<u>0.26</u>**
$P(T|A) = \frac{P(A|T)P(T)}{P(A)} = \frac{0.80\times 0.35}{0.525}$ or $\frac{P(T\cap A)}{P(A)} = \frac{0.28}{0.525} =$ **<u>0.53</u>**

c. From the tree diagram, $P(A'|C) =$ **<u>0.45</u>**

$P(A') = P(C\cap A') + P(N\cap A') + P(T\cap A') = 0.09 + 0.315 + 0.07 = 0.475$
Or
$P(A') = 1-P(A) = 1-0.525 = 0.475$
$P(C|A') = \frac{P(A'|C)P(C)}{P(A')} = \frac{0.45\times 0.2}{0.475}$ or $P(C|A') = \frac{P(A'\cap C)}{P(A')} = \frac{0.09}{0.475} =$ **<u>0.19</u>**

4.

a. Let Y be the number of lights that are green. Then Y~Bin (4, 0.7)

$$P(Y = 4) = \frac{4!}{4!\,(4-4)!}(0.7)^4(1-0.7)^{4-4} = \mathbf{0.240}$$

b. **X ~ Bin (5, 0.240)**

c. $P(X = 4) = \frac{5!}{4!(5-4)!}(0.240)^4(1-0.240)^{5-4} = \mathbf{0.013}$

5.

a. The random variable *X* is **hypergeometric**, with ***N* = 17, *M* = 11, and *n* = 4.**

b.

$$P(X = 2) = \frac{\binom{11}{2}\binom{17-11}{4-2}}{\binom{17}{4}} = \frac{\binom{11}{2}\binom{6}{2}}{\binom{17}{4}} = \frac{55 \times 15}{2380} = \mathbf{0.3466} \approx \mathbf{0.35}$$

c. $P(X \leq 2)$
$= P(X = 0) + P(X = 1)$

$$= \frac{\binom{11}{0}\binom{6}{4}}{\binom{17}{4}} + \frac{\binom{11}{1}\binom{6}{3}}{\binom{17}{4}}$$

= .0063 + .0924 = **.0987 ≈ 0.10.**

d. $P(X \geq 2) = 1 - P(X < 2) = 1\text{-}0.1 = 0.90$

or

$= 1 - [P(X = 0) + P(X = 1)] = 1 - [.0063 + .0924] =$ **.9013 ≈ 0.90.**