- UFERSA - Universidade Federal Rural do Semi-Árido
- Estatística
- Jailma Suerda Silva de Lima
- Vitor Oliveira Ropke

- 2ª Avaliação - 19/11/2020

(1)

$P(A) = \frac{65}{500} = 0,13 = \boxed{13\%}$ $P(B) = \frac{250}{500} = 0,5 = \boxed{50\%}$

$P(C) = \frac{250}{500} = 0,5 = \boxed{50\%}$

$P(A \cap B) = \frac{25}{500} = 0,05 = \boxed{5\%}$ $P(A \cap C) = \frac{40}{500} = 0,08 = \boxed{8\%}$

$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{0,05}{0,5} = 0,1 = \boxed{10\%}$

$P(A/C) = \frac{P(A \cap C)}{P(C)} = \frac{0,08}{0,5} = 0,16 = \boxed{16\%}$

---

(2) $E(x) = \Sigma x_i P(x_i) = 1 \cdot \frac{10}{36} + 2 \cdot \frac{8}{36} + 3 \cdot \frac{6}{36} + 4 \cdot \frac{4}{36} + 5 \cdot \frac{2}{36}$

$= \frac{10}{36} + \frac{16}{36} + \frac{18}{36} + \frac{16}{36} + \frac{10}{36} = \frac{70}{36} = \boxed{1,94}$

$\boxed{E(x) = 1,94}$

$\sigma^2 = E(x^2) - [E(x)]^2$

$E(x^2) = 1 \cdot \frac{10}{36} + 4 \cdot \frac{8}{36} + 9 \cdot \frac{6}{36} + 16 \cdot \frac{4}{36} + 25 \cdot \frac{2}{36}$

$= \frac{10}{36} + \frac{32}{36} + \frac{54}{36} + \frac{64}{36} + \frac{50}{36} = \frac{210}{36} = \underline{5,83}$

$[E(x)]^2 = 1,94^2 = \underline{3,76}$

$\sigma^2 = 5,83 - 3,76 = \boxed{2,07}$

$\boxed{\sigma^2 = 2,07}$

3 $\frac{25}{100} = 25\%$ dos motoristas $\quad n = 30 \quad p = 0{,}25 \quad q = 0{,}75$

$P(X=x) = C_x^n \cdot p^x \cdot q^{n-x}$

a) $P(X=6) = C_6^{30} \cdot 0{,}25^6 \cdot 0{,}75^{24} = 593775 \cdot 0{,}00024 \cdot 0{,}00100 \approx 0{,}1425 \approx \boxed{14{,}25\%}$

$\boxed{P(X=6) \approx 14{,}25\%}$

b) $P(X=0) = C_0^{30} \cdot 0{,}25^0 \cdot 0{,}75^{30} = 1 \cdot 1 \cdot 0{,}00018 = \boxed{0{,}018\%}$

$\boxed{P(X=0) = 0{,}018\%}$

c) $P(X>1) = 1 - (P(X=0) + P(X=1))$ $\quad P(X=0) = 0{,}00018$

$P(X=1) = C_1^{30} \cdot 0{,}25^1 \cdot 0{,}75^{29} = 30 \cdot 0{,}25 \cdot 0{,}00024 = 0{,}0018 = 0{,}18\%$

$1 - (0{,}00018 + 0{,}0018) = 1 - 0{,}00198 = 0{,}9980 = \boxed{99{,}80\%}$

$\boxed{P(X>1) = 99{,}80\%}$

d) $\mu = n \cdot p = 30 \cdot 0{,}25 = \boxed{7{,}5}$ $\quad \boxed{\mu = 7{,}5}$

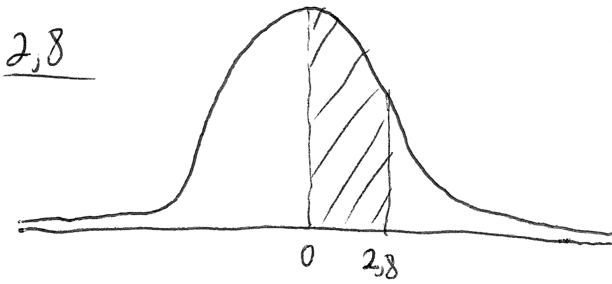
$\sigma^2 = n \cdot p \cdot q = 30 \cdot 0{,}25 \cdot 0{,}75 = \boxed{5{,}62}$ $\quad \boxed{\sigma^2 = 5{,}62}$

4 $\mu = 50 \quad \sigma = 2{,}5 \quad Z = \frac{X - \mu}{\sigma}$

a) $Z = \frac{50-50}{2{,}5} = 0$ $\quad Z = \frac{57-50}{2{,}5} = \frac{7}{2{,}5} = 2{,}8$

$P(0 \leq Z \leq 2{,}8) = 0{,}4974 = \boxed{49{,}74\%}$

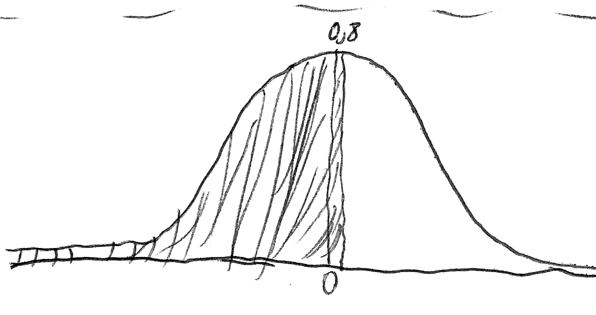
$\boxed{P(0 \leq Z \leq 2{,}8) = 49{,}74\%}$

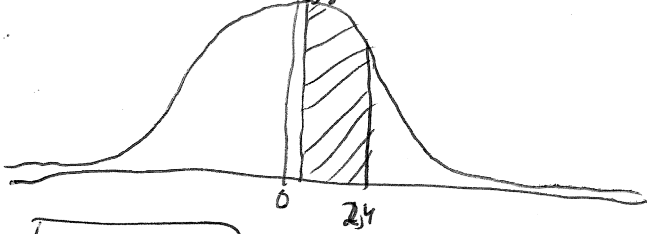



b) $Z = \frac{52-50}{2{,}5} = \frac{2}{2{,}5} = 0{,}8$

$P(Z \leq 0{,}8) = 0{,}5 + 0{,}2881 = 0{,}7881 = \boxed{78{,}81\%}$

$\boxed{P(Z \leq 0{,}8) = 78{,}81\%}$






c) $Z = \dfrac{56-50}{2,5} = \dfrac{6}{2,5} = \underline{2,4}$

$P(0,8 \leq Z \leq 2,4) = 0,4918 - 0,2881 = 0,2037 = \boxed{20,37\%}$

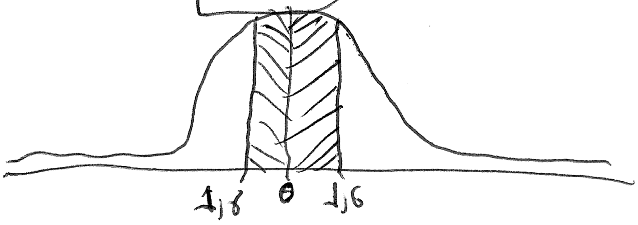
$\boxed{P(0,8 \leq Z \leq 2,4) = 0,2037 = 20,37\%}$

---

d) $Z = \dfrac{46-50}{2,5} = -\dfrac{4}{2,5} = \underline{-1,6}$ $\qquad Z = \dfrac{54-50}{2,5} = \dfrac{4}{2,5} = \underline{1,6}$

$P(-1,6 \leq Z \leq 1,6) = 0,4452 + 0,4452 = 0,8904 = \boxed{89,04\%}$

$\boxed{P(-1,6 \leq Z \leq 1,6) = 89,04\%}$




---

(5) $\lambda = 5$ por minuto $\qquad P(X=k) = \dfrac{\lambda^k e^{-\lambda}}{k!}$

a) $P(X=0) = \dfrac{5^0 \cdot e^{-5}}{0!} = \dfrac{1 \cdot 0,0067}{1} = 0,0067 = \boxed{0,67\%}$

$\boxed{P(X=0) = 0,67\%}$

---

b) Se $\lambda = 5$ em 1 minuto, então $\lambda = 2,5$ em 30 segundos.

$P(X=2) = \dfrac{2,5^2 \cdot e^{-2,5}}{2!} = \dfrac{6,25 \cdot 0,082}{2} = \dfrac{0,5125}{2} = 0,2562 = \boxed{25,62\%}$

---

c) $\lambda = 2,5$

$P(X=5) = \dfrac{2,5^5 \, e^{-2,5}}{5!} = \dfrac{97,66 \cdot 0,082}{120} = \dfrac{8,00812}{120} = 0,0667 = \boxed{6,67\%}$

$\boxed{P(X=5) = 6,67\%}$

d) Se $\lambda=5$ em 1 minuto então $\lambda=10$ em 2 minutos

$$P(X=7)=\frac{10^7.e^{-10}}{7!}=\frac{10^7.4,54.10^{-5}}{5040}=\frac{4,54.10^2}{5040}=\frac{454}{5040}=\underline{0,0901}$$

$$P(X=8)=\frac{10^8.e^{-10}}{8!}=\frac{10^8.4,54.10^{-5}}{40320}=\frac{4,54.10^3}{40320}=\underline{0,1126}$$

$$P(X=9)=\frac{10^9.e^{-10}}{9!}=\frac{4,54.10^4}{362880}=\frac{45400}{362880}=\underline{0,1251}$$

$$P(7\le X\le 9)=0,0901+0,1126+0,1251=\underline{0,3278}=\boxed{32,78\%}$$

$$\boxed{P(7\le X\le 9)=32,78\%}$$

---

e) $\lambda=5$ $\qquad P(X>3)=1-(P(X=0)+P(X=1)+P(X=2)+P(X=3))$

$$P(X=0)=\underline{0,0067}$$

$$P(X=1)=\frac{5^1.e^{-5}}{1}=\frac{5.0,0067}{1}=\underline{0,0335}$$

$$P(X=2)=\frac{5^2.e^{-5}}{2!}=\frac{25.0,0067}{2}=\frac{0,1675}{2}\simeq\underline{0,0838}$$

$$P(X=3)=\frac{5^3.e^{-5}}{3!}=\frac{125.0,0067}{6}=\frac{0,8375}{6}=\underline{0,1396}$$

$$P(X>3)=1-(0,0067+0,0335+0,0838+0,1396)$$
$$=1-(0,2636)=0,7364=\boxed{73,64\%}$$

$$\boxed{P(X>3)=73,64\%}$$