E : PEZZO DIFETTOSO $\rightarrow P(E) = 20\% = 0{,}20$ costante in ogni prova

$n = 4$

X: n° di volte ... E nelle n prove INDIPENDENTI
v.c. Binomiale

$P(E) = 0{,}20 = p$

$X \sim$ v.c. $Bin(n=4; p=0{,}2)$

$X = 0,1,2,3,\underset{\overset{\shortparallel}{n}}{4} \longrightarrow f(x) = \binom{n}{x} p^x (1-p)^{n-x} = \binom{4}{x}(0{,}2)^x (0{,}8)^{4-x}$

$E(X) = np = 4 \cdot (0{,}2)$

$V(X) = np(1-p) = 4 \cdot (0{,}2)(0{,}8)$

a) $P(X=1) = f(x=1) = \underbrace{\binom{4}{1}}(0{,}2)^1 (0{,}8)^3 = 0{,}4096$

b) $P(X=0) = f(x=0) = \underbrace{\binom{4}{0}}_{1}(0{,}2)^0 (0{,}8)^4 = 0{,}4096$

c) $P(X \leq 2) = \sum_{x=0}^{2} f(x) = f(x=0) + f(x=1) + f(x=2) = 2 \cdot (0{,}4096) + \binom{4}{2}(0{,}2)^2 (0{,}8)^2 = 0{,}9728$

ES. 8

lancio il DADO $5 = n$ PROVE INDIPENDENTI

E: $\boxed{3}$ $P(E) = \frac{1}{6} = p$ costante nelle n PROVE

X: n° di volte ... E nelle n prove INDIP. $X = 0,1,\dots,\underset{\overset{\shortparallel}{n}}{5}$

v.c. Binomiale $(n=5; p=\frac{1}{6})$

$f(x) = \binom{5}{x}\left(\frac{1}{6}\right)^x \cdot \left(\frac{5}{6}\right)^{5-x}$

a) $P(X=0) = f(x=0) = 0{,}4019$

b) $P(X \geq 1) = 1 - P(X=0) = 0{,}5981$

c) $P(X=4) = f(x=4) = 0{,}0032$

ES. 9

$n = 10$ INDIPENDENTI

$E = \boxed{M} (= F)$ $P(E : M) = P(E : F) = 0{,}50 = p$

X: n° di volte che ... E nelle n prove INDIP. $n = 10$

v.c. Binomiale $(n = 10 ; p = 0{,}5)$ $X = 0, 1, 2, \dots, 10$

$f(x) = \binom{10}{x} (0{,}5)^x (0{,}5)^{10-x}$

a) $P(X = 5) = f(x = 5) = 0{,}2461$

b) $P(3 \leq X \leq 8) = f(x = 3) + f(x = 4) + \dots + f(x = 8) =$

$= 1 - [f(x = 0) + f(x = 1) + f(x = 2) + f(x = 9) + f(x = 10)] =$

$= 0{,}9346$

ES. 10

$n = 5$ PROVE INDIP.

E: azzeccare la risposta giusta $\rightarrow P(E) = \frac{1}{3} = p$ cost.

X v.c. Binomiale: n° di volte ... E .. nelle n

$X = 0, 1, \dots, 5$ $f(x) = \binom{5}{x} \left(\frac{1}{3}\right)^x \left(\frac{2}{3}\right)^{5-x}$

$E(X) = n \cdot p =$
$= 5 \cdot \left(\frac{1}{3}\right) = 1{,}667$

$P(X \geq 4) = f(x = 4) + f(x = 5) = 0{,}04527$

$$f(x) = \begin{cases} x^2 & (0 < x \leq 1) \\ \frac{k}{3} & (1 < x \leq 3) \\ 0 & \text{ALTRIMENTI} \end{cases}$$

a) $k = ?$ \ X: v.c. CONTINUA $\quad \int_{c.e.} f(x)dx = 1$

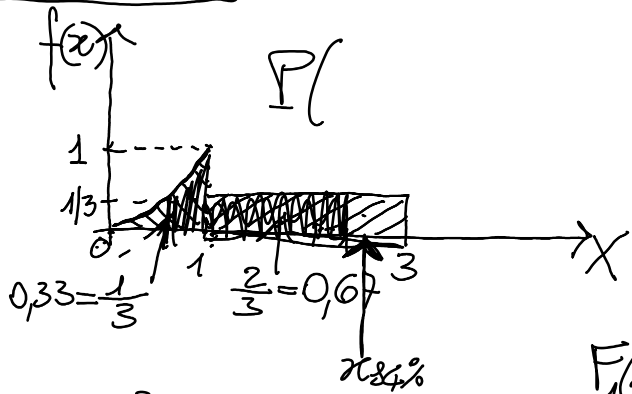
$$\boxed{1 = \int_0^1 x^2 \cdot dx + \int_1^3 \frac{k}{3} dx} = \left[\frac{x^3}{3}\right]_0^1 + \frac{k}{3} \cdot [x]_1^3 =$$

$$= \frac{1}{3}\left[1^3 - 0\right] + \frac{k}{3}\left[3 - 1\right] =$$

$$= \boxed{\frac{1}{3} + \frac{2}{3}k = 1} \rightarrow k = 1$$

$$f(x) = \begin{cases} x^2 & (\quad) \\ \frac{1}{3} & (\quad) \\ 0 & \text{ALTROVE} \end{cases}$$

$P($



$F_1(x_0 = 0,5)$

$F_1(x_0) = P(X \leq x_0)$

$F(x_0) = P(X \leq x_0) = \int_?^{x_0} f(x) dx$

per $0 \leq x < 1$

$$F_1(x) = \int_0^x f(t)dt = \int_0^x t^2 \cdot dt = \left[\frac{t^3}{3}\right]_0^x = \frac{1}{3}\left[x^3 - 0^3\right] = \boxed{\frac{1}{3}x^3}$$

per $1 \leq x < 3$

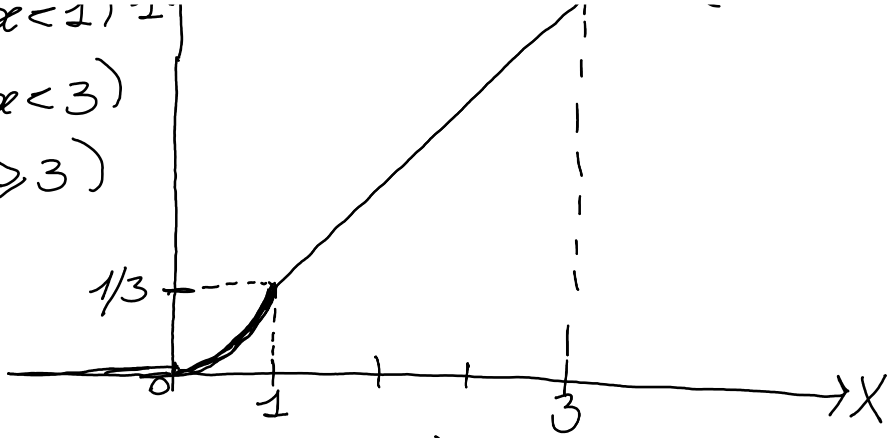
$$F_2(x) = \int_0^1 f(t)dt + \int_1^x f(t)dt = \int_0^1 t^2 \cdot dt + \int_1^x \frac{1}{3} dt =$$

$$= \frac{1}{3} + \frac{1}{3} \cdot [t]_1^x =$$

$$= \frac{1}{3} + \frac{1}{3}\left[x - 1\right] = \boxed{\frac{1}{3}x}$$

$$F(x) = \begin{cases} 0 & (x < 0) \\ \frac{x^3}{3} & (0 \leq x < 1) \\ \ldots & (1 \leq x < 3) \end{cases}$$

$$F(x)=\begin{cases} \frac{x}{3} & (0\le x<1) \\ \frac{1}{3}x & (1\le x<3) \\ 1 & (x\ge 3)\end{cases}$$



$$P\left(\frac{1}{2}<X<\frac{5}{2}\right)=P\left(X<\frac{5}{2}\right)-P\left(X<\frac{1}{2}\right)=$$

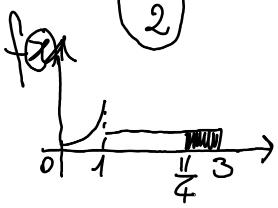
$$=F_2\left(X=\frac{5}{2}\right)-F_1\left(X=\frac{1}{2}\right)=$$

$$=\frac{1}{3}\cdot\frac{5}{2}-\frac{1}{3}\left(\frac{1}{2}\right)^3=\frac{19}{24}=0{,}79$$

$$P\left(X>\frac{11}{4}\right)=1-P\left(X<\frac{11}{4}\right)=1-F_2\left(\frac{11}{4}\right)=$$

$$\frac{11}{4}\ \overset{\vee}{}\ 2$$

$$=1-\frac{1}{3}\cdot\frac{11}{4}=\frac{1}{12}=0{,}08$$



$$E(X)=\int_{C.E.}x\cdot f(x)\,dx=\int_0^1 x\cdot(x^2)\,dx+\int_1^3 x\left(\frac{1}{3}\right)dx=$$

$$=\int_0^1 x^3\,dx+\int_1^3\frac{x}{3}\,dx=\frac{19}{12}$$

$$Y=2+3X$$

$$E(Y)=2+3E(X)=$$

$$=27/4$$

$\cancel{x_{84\%}\quad P(X\le x_{84\%})=\boxed{0{,}84}=F_2(x_{84\%})=\boxed{\frac{1}{3}\cdot x_{84\%}}}$

$\cancel{[1-3]}$

$\cancel{x_{84\%}=(0{,}84)\cdot 3=\boxed{2{,}4}}$

$$P(X\le c)=\boxed{0{,}80}=F_2(x_{80\%})=\boxed{\frac{1}{3}\cdot x_{80\%}}$$

$$c=x_{80\%}\in[1-3]$$

$$x_{80\%}=2{,}4$$

$$\underset{[1-3]}{\overset{x_{80\%}}{\cap}} \qquad x_{80\%} = 2,4$$

$$P(X \le x_{50\%}) = \boxed{0,50} = F_2(x_{50\%}) = \boxed{\frac{1}{3} \cdot x_{50\%}}$$

$x_{50\%}$ ‖ MEDIANA $\in [1-3]$

$$x_{50\%} = 1,5$$

$F(x)$

a) $f(x) = \dfrac{dF(x)}{dx}$ <

$$f(x) = \begin{cases} \frac{4}{5}x & (0 \le x < 1) \\ \frac{1}{5} & (1 \le x < 4) \end{cases}$$

GRAFICO

$$P\left(\frac{1}{2} < X < 2\right) = \frac{1}{2}$$

$$E(X) = 1,7667$$

$$x_{84\%} = 3,2$$

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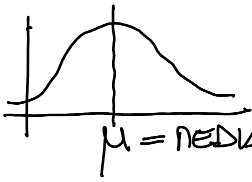
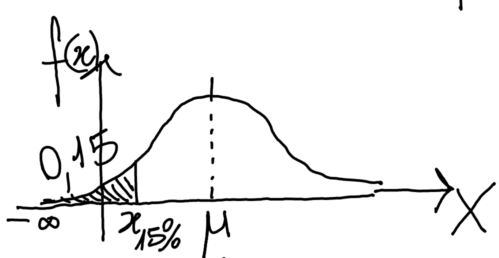
v.c. $N(\mu = 300;\ \sigma^{\cancel{2}} = 15)$



μ = MEDIANA = MODA = 300

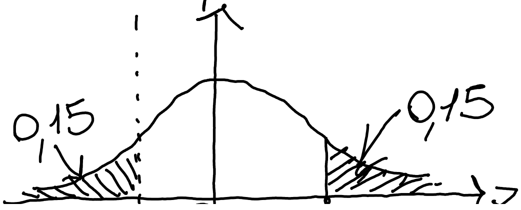
$x_{15\%}$

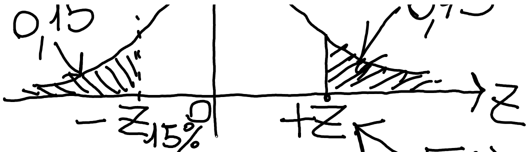


$$Z = \frac{X - \mu_x}{\sigma_x} \sim N(\mu = 0;\ \sigma^2 = 1)$$

v.c. N STD

TAVOLE $Z \rightarrow \Phi(z_0) = P(Z \le z_0)$





$-z_{15\%} = -1{,}04$

$F(+z) = P(Z < +z) = 1 - 0{,}15 = 0{,}85 \cong$
$\cong 0{,}8508$

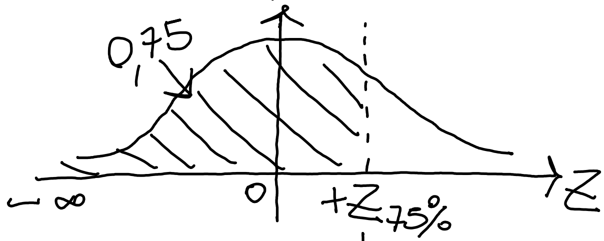
$+z = +1{,}04$

$$z_{15\%} = \boxed{-1{,}04 = \frac{x_{15\%} - 300}{15}}$$

$\sigma = 15$
$\sigma^2 = (15)^2$

$$x_{15\%} = 284{,}4$$

$x_{75\%}$



$F(z_{75\%}) = 0{,}75 \cong 0{,}7486$

$z_{75\%} = +0{,}67$

$$z_{75\%} = \boxed{+0{,}67 = \frac{x_{75\%} - 300}{15}}$$

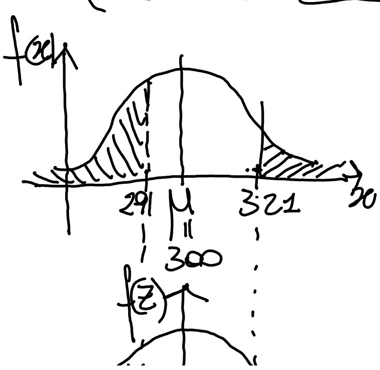
$$q_3 = x_{75\%} = 310{,}05$$

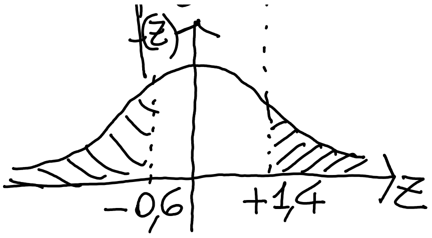
$P(X < 291 \cup X > 321) = P(X < 291) + P(X > 321) =$

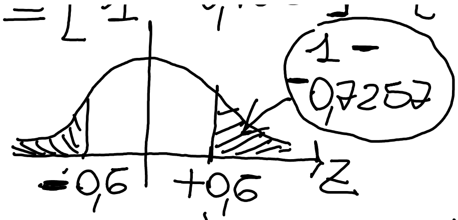
$= P\left(Z < \frac{291 - 300}{15}\right) + P\left(Z > \frac{321 - 300}{15}\right) =$

$= P(Z < -0{,}6) + P(Z > 1{,}4) =$

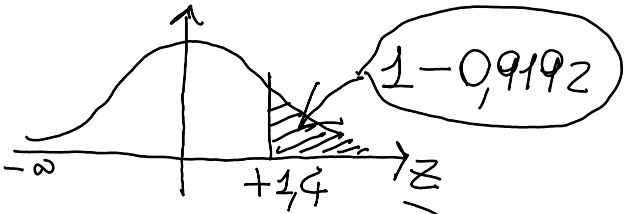
$= [1 - 0{,}7257] + [1 - 0{,}9192] = 0{,}3551$





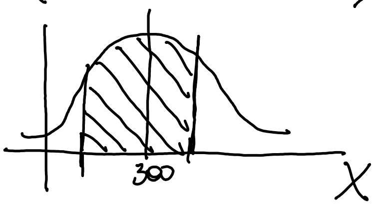


$$F(z=+0{,}6)=0{,}7257$$



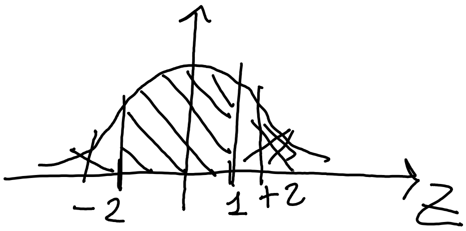
$$F(z=+1{,}4)=0{,}9192$$

$$P(270<x<315)=P\left(\frac{270-300}{15}<Z<\frac{315-300}{15}\right)=$$



$$=P(-2<Z<+1)=P(Z<+1)-P(Z<-2)=$$

$$=0{,}8185$$



$$P(X<400)=P\left(Z<\frac{400-300}{15}=+6{,}67\right)=1$$

$$P(Z<3{,}99)=F(3{,}99)=1$$