$b(x;n,p)$

${}_nC_x * p^x * (1-p)^{n-x}$

${}_nC_x =$

$C(n,x)$ $\boxed{\dfrac{n!}{x!(n-x)!}}$

(use chart to find values)

1) a) $b(5;8,0.3)$

$5=x$
$8=n$
$0.3=p$

$= \dfrac{8!}{5!(8-5)!} * (0.3)^5 * (1-.3)^3$

$56 * .00243 *$

$.912673$

d) $P(1 \le x)$

$n=9$
$p=0.1$
$x=1$

$\binom{9}{1} = 9 * (.01)^1 * (1-.1)^8$

2) $b(6;8,0.65)$

$x=6$
$n=8$
$p=0.65$

$\dfrac{8!}{6!(2)!} * (0.65)^6 * (1-.65)^2$

$28 *$

b) variance?

$n*p*(1-p)$

$x=$
$n=100$
$p=.3$

$100*.3*.7$
$100*.2*.8$
$100*.7*.3$

c) $P(3 \le x \le 5)$

$n=7$
$p=.65$

$— {}_7C_5 * (.65)^5 * (1-.65)^2$

$.29848476$ $21 * .11602906 * .1225$

$— {}_7C_4 * (.65)^4 * (1-.65)^3$

$.26787094$ $35 * .17850625 * .04287570$

$— {}_7C_3 * (.65)^3 * (1-.65)^4$

$.14680429$ $35 * .27462500 * .01500625$

$= \boxed{.71}$

#3) $\binom{20}{5} * (.20)^5 * (1-.20)^{15}$

$X = 5$

$N = 20$

$P = .20$

$15{,}504 * .00032 * .03518437$

0.17455952

$b(x; n, p)$

$nC_x * p^x * (1-p)^{n-x}$

N = trials

X = successes

p = probability # success

(Q = prob of failure)

Practice

$x = 8$ (exactly)

$N = 20$

$p = .20$

P(guessing exactly 8) $\binom{20}{8} * (.20)^8 * (1-.20)^{12}$

$125{,}970 * .00000256 * .06871948$

$= .02216088$

$x=5$

$n=20$

$p=.20$

$20\,C_4 * (.20)^4 * (.80)^{16}$

$b(x; n, p)$

$nC_x * p^x * (1-p)^{n-x}$

N = trials

X = successes

p = probability # success

(Q = prob of failure)

3b) Bin(x; n, p)

x = successes

n = trials

p = prob of happening

probability that one or less has a smoke detector?

#7

$n = 7$

$x = 1$

$p = \cancel{.81}\ .82$

$\binom{7}{1} * (\cancel{.81})^1 * (1-\cancel{.81})^6$ .82 .82

$\frac{7!}{1!(6!)} = 7 * \cancel{.81} * (\cancel{.19})^6$ .82 .18

$= .00026675$

$\boxed{.00027}$

d) $n=7$
$x=5$
$p=.82$

$\binom{7}{?} * (.82)^x * (1-.82)^{n-x}$

$\binom{7}{1}$ $7*(.82)^1*(.18)^6$ 0.00019523

$\binom{7}{2}$ $21*(.82)^2*(.18)^5$ 0.00266815

$P\binom{7}{3}$ $35*(.82)^3*(.18)^4$ 0.02025814

$P\binom{7}{4}$ $35*(.82)^4*(.18)^3$ 0.09228709

$P\binom{7}{5}$ $21*(.82)^5*(.18)^2$ 0.25225139

#5 $f(x) = 0.09375(4-x^2)$

$.375 - .09375x^2 \int_0^2$

B) $.375x - \frac{.09375}{3}x^3 \Big]_0^2$

$0.75 - 0.25 = .50$

c) $.375x - \frac{.09375}{3}x^3 \Big]_{-1}^{1}$

$.34375 + .34375$

D) $.375x - \frac{.09375}{3}x^3 \Big]_{-2}^{-.4}$ $-.4$ $-0.15 + .002 = -0.148$

-2 $-0.75 + -0.25 = -1$

$+$

$.375x - \frac{.09375}{3}x^3 \Big]_{.4}^{2}$ 2 $= .75 - .25 = .5$

$.4$ $= 0.15 - 0.002 = 0.148$

$= 0.352 + 1.148$

-0.796

6a) $kx^2 \int_0^2 = 1$

$\frac{kx^3}{3}\Big]_0^2 = 1$

$\frac{k8}{3} = 1$ $k8 = 3$
$k = 3/8$

b) $\frac{.375x^3}{3}\Big]_0^1$

$= 0.125$

c) $\frac{.375x^3}{3}\Big]_{.25}^{.50}$ $0.015625 - 0.001953125$

$= \sim 0.0137$

d) $\frac{.375x^3}{3}\Big]_2^{.50} - 0.015625 = .98438$

---

7 a) $\frac{x^2}{25}$ $\quad \frac{x^3}{25}\cdot\frac{1}{3} = \boxed{\frac{x^3}{75}}$

$\frac{x^3}{75}\Big]_0^3 = .36$ $\quad P(X<3)$

b) $P(2.5 \le X \le 3.5)$

$\frac{x^3}{75}\Big]_{3.5}^{2.5}$ $\quad 0.20833$ $\quad 0.5716$

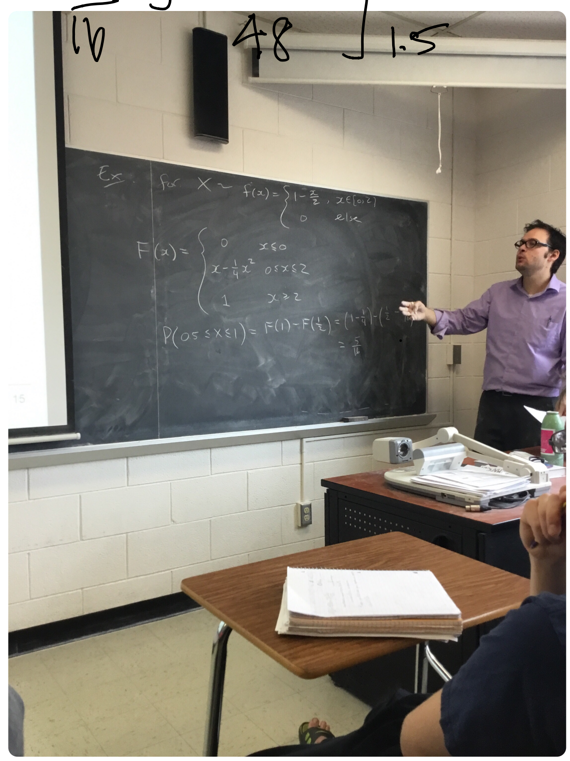
$F(3.5) - F(2.5) =$

$\frac{(3.5)^2}{25} - \frac{(2.5)^2}{25}$

$.49 - .25 = .24$

Prac. version

$\frac{x^2}{16} = \frac{x^3}{48}\Big]_{1.5}^{0.5}$



c) $p(x) = \frac{x^2}{25}$ $\quad 0 \le x \le 5$ $\quad 0.5$

$F(m) = .5$

$\therefore = \int_{-\infty}^{m} f(x)\,dx = \frac{1}{2}$

↳ area under graph

$f(x)$

$\parallel$

d) $\frac{x^2}{25}$ $\quad 0 \le x \le 5$ $\quad$ area under curve must $= 1$

$\int_{-\infty}^{\infty} f(x)\,dx = 1$

---

11) 11% - reworked

200 - sample

X = noncomf. but reworked

$b(x;n,p)$

$nC_x * p^x * (1-p)^{n-x}$

a) X ~~at most~~ 30?

b(3; 20, .11)

N = 20

X = 3

P = .11

$\binom{20}{0} * (.11)^0 * (.89)^{20}$

.097229965

20 $\binom{20}{1} * (.11)^1 * (.89)^{19}$

190 $\binom{20}{2} * (.11)^2 * (.89)^{18}$

1,140 $\binom{20}{3} * (.11)^3 * (.89)^{17}$

N = trials

X = successes

P = probability # success

(Q = prob of failure)

12 c) 2% droplets?

0.02 = −2.05 table

$-2.05 = \frac{x - 1050}{180}$

13 a) 11%, 200

30