1. (a) $\mu = \Sigma x [P(x)]$

$= 0.13 \times 0 + 1 \times 0.28 + 2 \times 0.30 + 3 \times 0.17 + 4 \times 0.08 + 5 \times 0.04$

$= 1.91$

$\sigma = \sqrt{\Sigma x^2 P(x) - \mu^2} = \sqrt{8.29 - 1.91^2} = 2.1545$

(b) ① $P(x > 0) = P(x=1) + P(x=2) + P(x=3) + P(x=4) + P(x=5)$

$= 0.28 + 0.30 + 0.17 + 0.08 + 0.04$

$= 0.87$

(b) ② $P(x=2) = 0.30$

(b) ③ $P(x \leq 2) = P(x=0) + P(x=1) + P(x=2)$

$= 0.13 + 0.28 + 0.30$

$= 0.71$

2. $C(n,r) = \dfrac{n!}{r! \, (n-r)!}$ $n = 25, r = 4$

$C(n,r) = \dfrac{25!}{4! \, (21)!} = 12\,650$

$P(n,r) = \dfrac{n!}{(n-r)!} = \dfrac{25!}{21!} = 303600$

3. (a)

x	10
P(x)	0.7

$p = 0.7$
$n = 10$

(b) $\mu = np = 10 \times 0.7 = 7$

$\sigma = \sqrt{np(1-p)} = \sqrt{7(0.3)} = 1.4491$

(c) (i) $P(x=8) = {}^{n}C_{x} \, p^{x} \, (1-p)^{n-x}$

$P(x=8) = {}^{10}C_{8} \times 0.7^{8} \times (0.3)^{2} = 0.2334$

(ii) $P(x=0) = 10C_0 (0.7)^0 \cdot 0.3^{10}$

$P(x=0) = 5.9049 \times 10^{-6}$

(iii) $P(x<5) = P(x=4) + P(x=3) + P(x=2) + P(x=1) + P(x=0)$

$= 10C_4 (0.7)^4 (0.3)^6 + 10C_3(0.7)^3 0.3^7 + 10C_2 0.7^2 0.3^8 + 10C_1 (0.7)(0.3)^9 +$

$10C_0 0.7^0 0.3^{10}$

$= 0.03676 + 9.00 \times 10^{-3} + 1.447 \times 10^{-3} + 1.3778 \times 10^{-4} +$

5.9049×10^{-6}

$= 0.04735$

4. $\lambda = 1.6$

a) $P(x=x) = \dfrac{\lambda^x e^{-\lambda}}{x!}$

b) $\mu = \lambda = 1.6$

$\sigma = \sqrt{\lambda} = \sqrt{1.6} = 1.2649$

c) $P(x=0) = \dfrac{1.6^0 e^{-1.6}}{0!} = 0.2019$

$= 0.2019$

d) $P(x=3) = \dfrac{1.6^3 * e^{-1.6}}{3!} = 0.1378$

e) $P(x \leq 2) = P(x=2) + P(x=1) + P(x=0)$

$= \dfrac{1.6^2 e^{-1.6}}{2!} + \dfrac{1.6^1 e^{-1.6}}{1} + \dfrac{1.6^0 e^{-1.6}}{0!}$

$= 0.2584 + 0.3230 + 0.2019$

$= 0.7833$

5.

X	498	98	18	-8	-2	Total
P(X)	$\frac{1}{1000}$	$\frac{1}{500}$	$\frac{5}{1000}$	0.02	0.972	1000/1000
X P(X)	$\frac{498}{1000}$	$\frac{98}{500}$	$\frac{90}{1000}$	$\frac{-160}{1000}$	$\frac{-1944}{1000}$	
$x^2 P(x)$	248.004	19.208	1.62	1.28	3.888	$\bar{x} = 274$

$$\mu = \sum X \, p(x) = \frac{498}{1000} + \frac{196}{1000} + \frac{180}{1000} + \frac{160}{1000} - \frac{1944}{1000} = \frac{-910}{1000}$$

$$= -0.91$$

$$\sigma = \sqrt{\sum x \, p(x) - \mu^2}$$

$$= \sqrt{274 - (-0.91^2)} = 16.5279$$