ENGR 371 - W - 2017

#1) $p = 0.01$

x = # cracked eggs

$n = 12$

a) $\binom{n}{x} p^x (1-p)^{n-x} = \binom{12}{x} 0.01^x \, 0.99^{12-x} \quad x = 0, 1, 2, \ldots, 12$

b) $P(x \geq 1) = 1 - P(x < 1)$

$= 1 - \binom{12}{0} 0.01^0 \, 0.99^{12}$

$= 1 - 0.99^{12}$

$= 0.1136$

c) $\mu = np = (12)(0.01) = 0.12$

$\sigma^2 = \mu(1-p) = (0.12)(0.99) = 0.1188$

#2) $\mu = 60 \text{ min}$

$\sigma = 5 \text{ min}$

$\sigma^2 = 25 \text{ min}$

$z = \left(\frac{x - 60}{5}\right)$

a) $P(x < 45)$

$= P\left(\frac{x-60}{5} < \frac{45-60}{5}\right)$

$= P(z < -3)$

$= 1 - P(z < 3)$

$= 1 - \phi(3)$

$= 1 - 0.998650$

$= 0.00135$ ∴

b) $P(x > 65)$

$= P\left(\frac{x-60}{5} > \frac{65-60}{5}\right)$

$= P(z > 1)$

$= 1 - P(z < 1)$

$= 1 - \phi(1)$

$= 1 - 0.841345$

$= 0.1587$ ∴

c) $P(x < T) = 0.99$

$P\left(z < \frac{T-60}{5}\right) = 0.99$

$\phi\left(\frac{T-60}{5}\right) = 0.99$

$\phi(?) = 0.99$

$\phi = 2.33$

$\frac{T-60}{5} = 2.33 \longrightarrow$ $T = 71.65 \text{ mins}$ ∴

#3) (CH-2.8) (#226)

A = Dominant
B = Regressive
O = Other

G_1

	A	B	O
A	5	25	30
B	7	63	35
O	20	15	800

a) $P(A) = \frac{5+25+30+7+20}{1000} = 0.087$ ∴

$P(B) = \frac{7+63+35+25+15}{1000} = 0.145$ ∴

b) $P(A \cap B) = \frac{25+7}{1000} = 0.032$ ∴

c) $P(A \cup B) = \frac{5+25+30+7+20+63+35+15}{1000} = 0.2$ ∴

d) $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.032}{0.145} = 0.2207$ ∴