機率與統計 HW6 何寬羿 資訊 114 C34104032

(6.20) 依題意，題目所使用的是 Normal Dist. X

standard normal dist.: $Z = \frac{X-\mu}{\sigma}$

(a) 所求 = P(X > 9.5) = P(Z > $\frac{9.5-8}{0.9}$) ≈ P(Z > 1.67) = 1 – (Z ≤ 1.67)

= 1 – 0.9525(by 查表) = 0.0475

(b) 所求 = P(X ≤ 8.6) = P(Z ≤ $\frac{8.6-8}{0.9}$) ≈ P(Z ≤ 0.67) = 0.7486 (by 查表)

(c) 所求 = P(7.3 ≤ X ≤ 9.1) = P($\frac{7.3-8}{0.9}$ ≤ Z ≤ $\frac{9.1-8}{0.9}$) ≈ P(-0.78 ≤ Z ≤ 1.22)

= P(Z ≤ 1.22) - P(Z < -0.78) ≈ 0.8888 – 0.2148(因-0.79 是表上存在的、小於-0.78 的最大值，故使用 P(Z ≤ -0.79)的值代替 P(Z < -0.78)) = 0.674

(6.28) 依題意，應使用 Binomial Dist. ~n(x; 100, 0.72), $n = 100, p = 0.72$
但因為 n 夠大(np 及 n(1-p)都大於 5)，可用 Standard Normal Dist.來近似

$\mu = np = 72;\ \sigma = np(1-p) = \sqrt{20.16}$

(a) 所求 = P(X ≥ 80) = 1 - P(X < 80) ≈ 1 – P(Z < $\frac{80-72}{\sqrt{20.16}}$) ≈ 1 - P(Z < 1.78)

≈ 1 - P(Z ≤ 1.77) = 1 – 0.9616 = 0.0384

(b) 所求 = P(X ≤ 68) ≈ P(Z ≤ $\frac{68-72}{\sqrt{20.16}}$) = P(Z ≤ -0.89) = 0.1867

(6.58)

(a) 依題意，使用 Poisson Dist. ~ p(x; 5)

所求 = P(X > 10) = 1 – P(X ≤ 10) = 1 – 0.9863(by 查表) = 0.0137

(b) 依題意，使用 Gamma Dist. f(x) , β = 1/5 = 0.2, α = 10

所求 = P(X > 2) = 1 – P(X ≤ 2) = 1 - $\int_0^2 \frac{1}{0.2\text{^}10} \frac{x^9 e^{\frac{-x}{0.2}}}{\Gamma(10)} dx$ ，令 y=x/β, dy = dx/β

= 1 - P(Y ≤ 10) = 1 - $\int_0^{10} \frac{y^9 e^{-y}}{\Gamma(10)} dy \approx 1 - 0.542$ = 0.458