06/NYJC/II/30 EITHER (Modified)

$E(X) = 1.5 \qquad Var(X) = \frac{1}{12}$.

Let $A = X_1 + X_2 + \dots X_{50}$

Since n is large, by Central Limit Theorem,

$A \sim N(50 \times 1.5,\ 50 \times \frac{1}{12})$ approx

Let $B = y_1 + y_2 + \dots y_{100}$

Since n is large, by CLT

$B \sim N(100 \times \ln 2,\ 100[\frac{1}{2} - (\ln 2)^2])$ approx

$A - B \sim N(5.685282,\ 6.121365275)$ approx

$P(A > B)$

$= P(A - B > 0)$

≈ 0.989 (3sf).

06/VJC/II/24

Let X be the mass of each pill. Let C be the mass of a container.

$E(X) = 0.18 \qquad E(C) = 29.9$

$Var(X) = 0.005^2 \qquad Var(C) = 0.5^2$

Let $T = X_1 + X_2 + \dots + X_{500}$

$E(T) = 0.18 \times 500$

$Var(T) = 0.005^2 \times 500$

$E(T+C) = 90 + 29.9 = 119.9g$.

$Var(T+C) = 0.0125 + 0.5^2 = 0.2625\ g^2$

Let y be the mass of a packet of Power Pills.

As n is large, by CLT,

$y \sim N(119.9 \times 60,\ 0.2625 \times 60)$ approx

$P(y < 7200)$

$= 0.93471499$

≈ 0.935 (3 sf)