Stats 1 - (3) Binomial

(1) $E \sim B(40, 0.3)$

a) $P(B \leq 10) = 0.3084$ from tables

b) $P(B \geq 15) = 1 - P(B \leq 14)$

$= 1 - 0.8074 = 0.1926$

c) $P(6 \leq B \leq 18)$

CAN BE 6, 7, 8 ... 17, 18

∴ Need $P(B \leq 18) - P(B \leq 5)$

$= 0.9852 - 0.0086 = 0.9766$

d) $P(B \neq 10)$

$= 1 - P(B = 10)$

(2) a) i) $T \sim B(10, 0.4)$

$P(T \leq 3) = 0.3823$ (tables)

ii) $T \sim B(40, 0.4)$

$P(10 < T < 20)$

CAN BE 11, 12, 13 ... 18, 19

∴ Need $P(T \leq 19) - P(T \leq 10)$

$= 0.8702 - 0.0352 = 0.835$

b) i) Mean $= np = 5 \times 0.4 = 2$

Var $= np(1-p) = 5 \times 0.4 \times 0.6 = 1.2$

∴ sd $= \sqrt{1.2} = 1.09544...$

ii) From calc: $\Sigma x = 26$

Mean $(\bar{x}) = 2$ sample sd $(s) = 1.1547...$

iii) Means are the same and sds are similar.

So the claim seems valid

(3) a) $U \sim B(40, 0.15)$

i) $P(U = 6) = {}^{40}C_6 \times 0.15^6 \times 0.85^{34}$

$= 0.17415...$

ii) $P(U \leq 5) = 0.4325$ (from tables)

iii) $P(5 < U < 10)$

CAN BE: 6, 7, 8, 9

need $P(U \leq 9) - P(U \leq 5)$

$= 0.9328 - 0.4325 = 0.5003$

b) MEAN $= np = 32 \times 0.15 = 4.8$

VAR $= np(1-p) = 32 \times 0.45 \times 0.85 = 4.08$

SD $= \sqrt{4.08} = 2.0199...$

c) From calc: $\Sigma x = 77$

mean $(\bar{x}) = 7.7$

sample sd $(s) = 1.33749...$

The mean is bigger and sd is lower.

This suggests the model is unsuitable.