15 c # 1c

$X \sim B(4, \frac{1}{2})$

$\binom{4}{1} = \frac{4!}{1!\,3!}$

$= \frac{4 \cdot 3!}{3!}$

$P(X \leq 1) = P(X=0) + P(X=1)$

$= \binom{4}{0}\left(\frac{1}{2}\right)^0\left(\frac{1}{2}\right)^4 + \binom{4}{1}\left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^3$

$4 \cdot \frac{1}{16}$

$= \frac{1}{16} + \frac{4}{16}$

$= \frac{5}{16}$

(d) $P(X \geq 1) = 1 - P(X=0)$

$= 1 - \binom{4}{0}\left(\frac{1}{2}\right)^0\left(\frac{1}{2}\right)^4$

$= 1 - \frac{1}{16}$

$= \frac{15}{16}$

15C #2d

$$P(X \geq 2) = 1 - P(X \leq 1)$$

$$X \sim B(10, 1/5)$$

Calculator

- $P(X = 3)$ = binomialpdf $(10, 1/5, 3)$
- $P(X \leq 3)$ = binomialcdf $(10, 1/5, 3)$

Brain:

- $P(X < 3) = P(X \leq 2)$
- $P(X \geq 3) = 1 - P(X \leq 2)$
- $P(X > 3) = 1 - P(X \leq 3)$

15D #3 X = number of defects

$X \sim B(16, 0.01)$

(a) $P(X=0) = 0.851$

(b) $P(X=3) = .00491$

(c) $P(X \geq 2) = 1 - P(X \leq 1) = 0.0109$

#4 X = number of engaged

$X \sim B(10, 0.25)$

(a) $P(X=5) = 0.0584$

(b) At least 3 free lines → 7 or fewer lines engages

$P(X \leq 7) = 0.9996$ (3 sigma: 1)

#6 X = number of wobblers in a set of 6

$X \sim B(6, 0.15)$

(a) $P(X > 1) = 1 - P(X \leq 1)$

$= 0.224$

(b) $P(X = 1) = 0.399$

#5 X = number of days in bed by 7:30 out of 5 days.

$X \sim B(5, 0.4)$

$P(X \leq 3) = 0.913$

#6 (again)

You check 15 rows of desks.

T = number of rows with exactly 1 wobbler.

$P(T = 5)$ binomialpdf(6, 0.15, 1)

$\downarrow$

$T \sim B(15, 0.399335)$

$P(T = 5) = 0.186$

Ex. The prob. that a shooter makes a Bullseye is 0.55.
A shooter takes 6 shots.

(a) What's the prob. of at least 2 bullseyes?

$P(X \geq 2) = 1 - P(X \leq 1) = 1 - \text{binomcdf}(6, 0.55, 1)$
cdf
$= 0.931$

(b) What's the prob. of fewer than 3 bullseyes?

$P(X < 3) = P(X \leq 2) = 0.255$