Review – Calculator Section 1 chapter 15

#1 (a) $1 - P(\text{no 1 or 6}) = 1 - \left(\frac{2}{3}\right)\left(\frac{2}{3}\right)\left(\frac{2}{3}\right) = \frac{19}{27}$

(b)

x	-5	1
$P(X=x)$	$\frac{8}{27}$	$\frac{19}{27}$

(i) $E(X) = -5\left(\frac{8}{27}\right) + 1\left(\frac{19}{27}\right) = \frac{-21}{27} \approx 0.78$

(ii) $9\left(\frac{-21}{27}\right) = \frac{-21}{3} = -7$

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(2) X = number of songs I like out of 8

$X \sim B(8, 0.30)$

(a) $P(X=3) = \text{binomialpdf}(8, 0.3, 3) = 0.254$

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

$= 1 - \text{binomialcdf}(8, 0.3, 2)$

$= 0.448$

#3 X = number of ⚅ in 6 dice

$X \sim B(6, 1/6)$

$P(X=3) = \text{binomialpdf}(6, 1/6, 3) = 0.05358$

Y = number of times you get 3 ⚅s in 5 throws

$Y \sim B(5, 0.05358)$

$P(Y=2) = \text{binomial}(5, 0.05358, 2)$

$= 0.0243$

#4 X = number of lefties in a sample of 10

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

a)i) $P(X=4) = \text{binomialpdf}(10, 1/5, 4) = 0.0881$

ii) $P(X>5) = 1 - P(X \leq 5)$

$= 1 - \text{binomialcdf}(10, 1/5, 5) = 0.00637$

b) $E(X) = 10\left(\frac{1}{5}\right) = 2$

c) $1 - P(\text{no lefty})$

$= 1 - \text{binomialpdf}(n, 1/5, 0) = 0.95$

↑ try different numbers here

$\boxed{n = 14}$

#5 $P(|Z| \leq a) = 0.85$

$P(-a \leq Z \leq a) = 0.85$ $\boxed{a = 1.44}$

$\text{normalcdf}(-X, X) = 0.85$

#6 $X \sim N(71, \sigma^2)$

(a) $P(X < 80) = 0.85$

$Z = \text{invnorm}(0.85) = 1.0364 = \frac{80 - 71}{\sigma}$

$\boxed{\sigma = 8.68}$

(b) $P(X > 65) = P(Z > -0.691)$ = normalcdf $(-0.691, 9)$

$$Z = \frac{65 - 71}{8.68} = -0.691$$

$= \underline{0.755}$

#8 X = mins to get to school

$X \sim N(\mu, 2)$

$P(X > 35) = 0.2 \leftarrow 80^{th}$ percentile

(a) $z = \text{invnorm}(0.80) = 0.8416 = \frac{35 - \mu}{2}$

$\mu = 33.3$ mins

(b) $8{:}45 - 8{:}10 = \underline{35 \text{ mins}}$

$P(X \leq 35) = P(Z \leq 0.85) = \underline{0.802}$

$z = \frac{35 - 33.3}{2} = 0.85$

$\underline{(0.802)^5 = 0.332}$

(c) $P(X \leq 3)$ = binomialcdf(5, 0.802, 3)

↑ on time fewer than 3 days

$\doteq$ 0.259