S2 Blockbusters Solutions

A) i) A statistical process devised to describe or make predictions about the expected behaviour of a real world problem.
ii) A sampling frame is a list of sampling elements
iii) A sampling unit contains an element (or a collection of elements) from a population.

B) a) 0.0664 b) 0.8606 c) 0.7201 d) 0.4402

C) $\mu_1 \neq \mu_2$ –two tailed test andf $\mu_1 > \mu_2$ or $\mu_1 < \mu_2$ – one tailed test.

D) 0 $\frac{3}{4}$

E) a) n large, p small. b) 0.1396

F) i) 0.4529 ii) 0.464 iii) Normal

G) Critical region is $X \leq 6$

H) a) 5 b) $1\frac{1}{3}$ c) 0.425

I) b) $F(x) = \begin{cases} 0 & x < 1 \\ x - \frac{1}{8}x^2 - \frac{7}{8}, & 1 \leq x \leq 3 \\ 1 & x > 3 \end{cases}$ c) 1.764

J) 0.0119

K) a) 0.1849 b) 0.8576

L) a) Fixed number of balloons in a packet, constant probability of a blue balloon being produced.
b) 0.1221
c) 0.2493

M) a) $\mu = 3, \sigma^2 = 2.25$ b) 0.6840

N) a) 0.0337 b) 0.0843 c) 0.8753

O) $k = \frac{2}{3}$

P) $a) \ 2$ b) $\frac{1}{3}$

Q) $a) \ 3.5$ b) 0.4

R) i) A sampling frame is a named or numbered list of all members of the population.
ii) A random variable consisting of any function of the observations and no other quantities. Or a numerical property of a sample.

S) Same as C

T) i) This is an assumption made about the population parameter that we test using evidence from the sample.
ii) The null hypothesis is what we assume to be correct and the alternative hypothesis is what we conclude if we are wrong.
iii) Null hypothesis = H_0, Alternative hypothesis = H_1

U) $0.0577 > 0.025$ so there is insufficient evidence to reject H_0

V) Median $5 = \frac{5}{32}$ Median $10 = \frac{54}{64}$

W) a) 0.3559 b) 0.1694 c) 0.159

X) a) $f(x) = f(x) = \begin{cases} \frac{1}{\beta-\alpha}, & \alpha < x < \beta \\ 0, & otherwise \end{cases}$

b) $\alpha = -2, \quad \beta = 6$

Y) a) 0.0024 b) £13200