SL Exam Review

1 (a) $\dfrac{1+2+4+6+9+14}{6} = \dfrac{36}{6} = 6$

(b) $[1 \quad 2 \quad 4] \; [6 \quad 9 \quad 14]$

Q_1, Q_3

median $= \dfrac{4+6}{2} = 5$

lower quartile $= 2$

(c) median $= 5$

(e) upper quartile $= 9$

(f) $IQR = Q_3 - Q_1$
$= 9 - 2$
$= 7$

(d) range $=$ max $-$ min
$= 14 - 1$
$= 13$

2 (a) B (b) B
(c) A (d) A

(e) $5730 - 3900 = 1850$

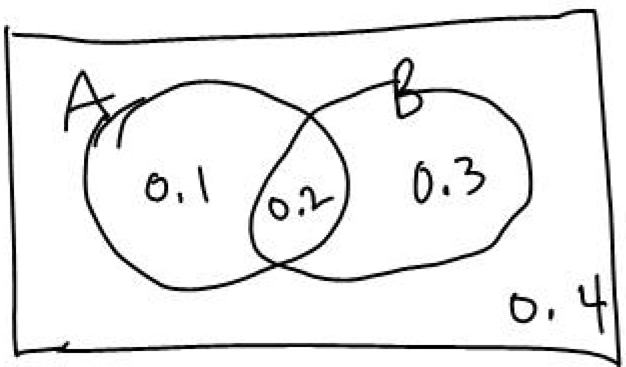
3 (a) 32 (b) The median is the 16th length : 30

(c) Q_3 is the 24th length $\left(\frac{3}{4} \cdot 32 = 24\right)$: 33

(c) Q is the 8^{th} length $\left(\frac{1}{4} \cdot 32 = 8\right)$: $\underline{\underline{28}}$

(d) $16 - 0 = 16$

(4)



$P(A \cup B) = 0.6$ $\quad P(A) + P(B)$

$\left.\begin{array}{l} P(A) = 0.3 \\ P(B) = 0.5 \end{array}\right\} \; 0.8$

$$\begin{array}{r} 0.8 \\ -\,0.6 \\ \hline 0.2 \end{array}$$

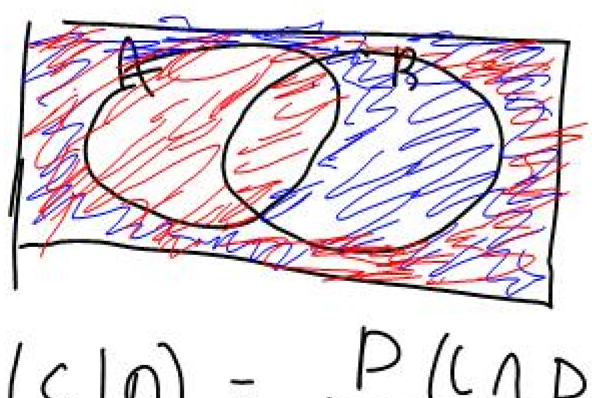
(a) $P(A \cap B) = 0.2$

(b) $P(A) \cdot P(B) = (0.3)(0.5) = 0.15$

$P(A \cap B) = 0.2$

these are not equal so A and B are <u>not</u> independent

(c) $P(A' \cap B') = 0.4$

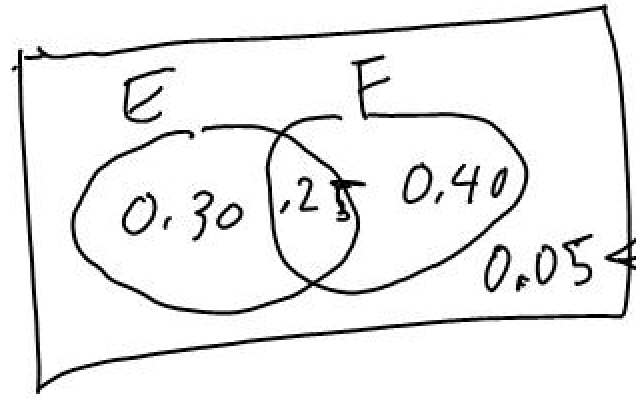


$\left.\begin{array}{l} \text{blue} = A' \\ \text{red} = B' \end{array}\right\}$ $A' \cap B'$ is everything outside the circles

(5) $P(C \mid D) = \dfrac{P(C \cap D)}{P(D)}$

$\dfrac{1}{3} = \dfrac{\frac{1}{5}}{P(D)} \Rightarrow P(D) = \dfrac{\frac{1}{5}}{\frac{1}{3}} = \dfrac{3}{5}$

(6)



so the circles add up to 0.95

$0.55 + 0.65 = \underline{1.20}$

so the overlap is

$1.20 - 0.95 = 0.25$

(a) $P(E \cap F) = 0.25$

(b) $P(E|F) = \dfrac{P(E \cap F)}{P(F)}$

$$= \frac{0.25}{0.65} = \frac{5}{13}$$

(7) $\mu = 20, \ \sigma = 2$

(a) $20 + 2(2) = 24$

(b) For 20, $z = 0$

For 22, $z = \dfrac{x - \mu}{\sigma} = \dfrac{22 - 20}{2} = 1$

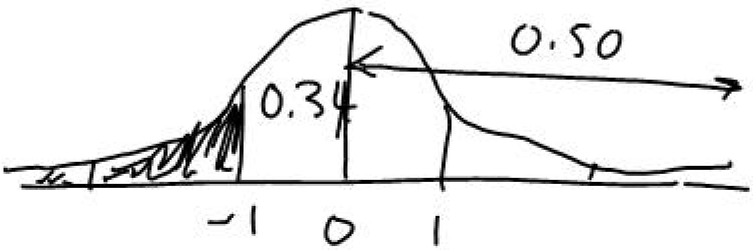
$P(0 < z < 1) = \frac{1}{2}(0.68) = 0.34$

This is the proportion of data values within 1 std. dev. of the mean

$P(-1 < z < 1) = 0.68$

(7c) For 18, $z = \frac{18-20}{2} = -1$

$P(z < -1) = 1 - 0.34 - 0.50 = \underline{0.16}$



2 rolls, 0 successes

chance of success

chance of failure

(8) $X \sim B(2, 1/6)$

(a) $P(X=0) = \binom{2}{0}\left(\frac{1}{6}\right)^0\left(\frac{5}{6}\right)^2 = \frac{25}{36}$

(b) $P(X=2) = \binom{2}{2}\left(\frac{1}{6}\right)^2\left(\frac{5}{6}\right)^0 = \frac{1}{36}$

(c) $E(X) = np = 2 \cdot \frac{1}{6} = \frac{1}{3}$

(9) $f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$

(9) $f'(3) = \lim_{x \to 3} \frac{(2x^2 - x + 1) - (\overbrace{2 \cdot 3^2 - 3 + 1}^{16})}{x - 3}$

$= \lim_{x \to 3} \frac{2x^2 - x - 15}{x - 3} = \lim_{x \to 3} \frac{(2x+5)\cancel{(x-3)}}{\cancel{x-3}}$

$= 2(3) + 5 = 11$

(i) $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

$$f'(x) = \lim_{h \to 0} \frac{\sqrt{2(x+h)-5} - \sqrt{2x-5}}{h}$$

$$= \lim_{h \to 0} \frac{\left(\sqrt{2(x+h)-5} - \sqrt{2x-5}\right)\left(\sqrt{2(x+h)-5} + \sqrt{2x-5}\right)}{h\left(\sqrt{2(x+h)-5} + \sqrt{2x-5}\right)}$$

The blue terms are where we're multiplying by the conjugate of the numerator.

$$= \lim_{h \to 0} \frac{2(x+h)-5 - (2x-5)}{h\left(\sqrt{2(x+h)-5} + \sqrt{2x-5}\right)}$$

$$= \lim_{h \to 0} \frac{\cancel{2x} + 2h \cancel{-5} \cancel{-2x} \cancel{+5}}{h\left(\sqrt{2(x+h)-5} + \sqrt{2x-5}\right)}$$

$$= \lim_{h \to 0} \frac{2\cancel{h}}{\cancel{h}\left(\sqrt{2(x+h)-5} + \sqrt{2x-5}\right)}$$

$$= \frac{2}{\sqrt{2(x+0)-5} + \sqrt{2x-5}} = \frac{\cancel{2}\,1}{\cancel{2}\sqrt{2x-5}}$$

$$\boxed{\frac{1}{\sqrt{2x-5}}}$$

Calculator Part

get to Lists by $\boxed{\text{Stat}}$ $\boxed{\text{edit}}$

(1) enter number of poems in L_1

enter the frequencies in L_2

Use $\boxed{\text{stat}}$ $\boxed{\text{Calc}}$ $\boxed{\text{1-var stats}}$

1 var stats L_1, L_2 ← on the screen

(a) median = 5 (b) $Q_1 = 4$ (c) mode = 5

(12) In L_1, put the median of each interval. Put frequencies in L_2

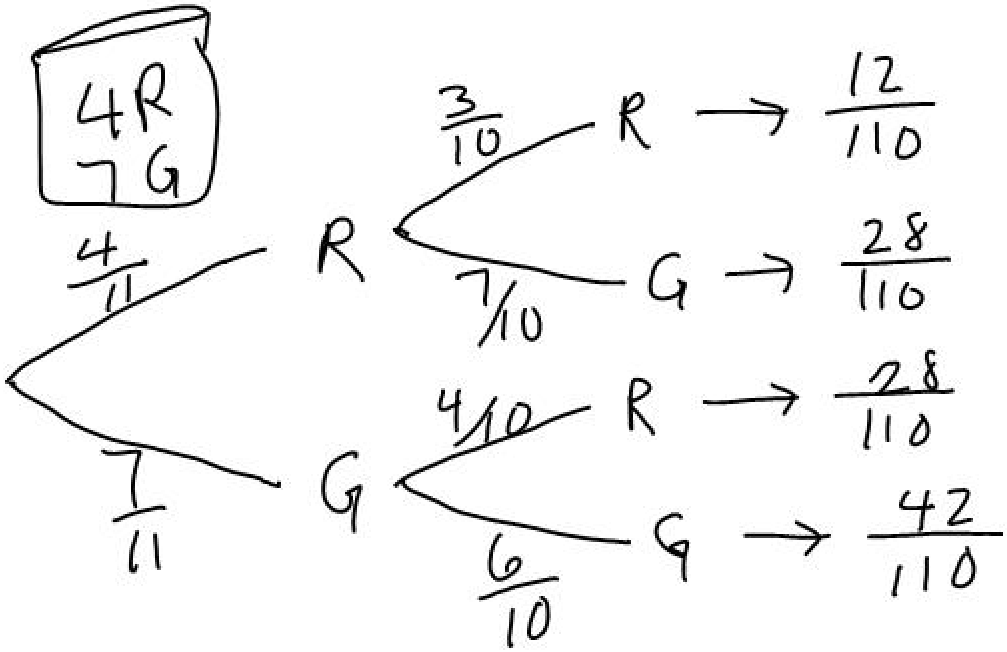
L_1	L_2
22.5	4
27.5	9
⋮	⋮
47.5	9

Use $\boxed{\text{stat}}$ $\boxed{\text{calc}}$ $\boxed{\text{1-var stats}}$

1 var stats L_1, L_2 ← on the screen

ⓐ 35 ⓑ 35 ⓒ 8.54 ⓓ $30 \le x < 35$

(13)



ⓐ $P(R,R) = \frac{12}{110}$

ⓑ $P(R,G) + P(G,R) = \frac{28}{110} + \frac{28}{110} = \frac{56}{110}$

(14) $0.02 + p + 2p + 0.2 + 0.18 = 1$

$3p + 0.4 = 1$

$3p = 0.6$

$p = 0.2$

X	0	1	2	3	4
P(x)	0.02	0.2	0.4	0.2	0.18

$E(X) = 0(0.02) + 1(0.2) + 2(0.4) + 3(0.2) + 4(0.18)$

$= \underline{\underline{2.32}}$

(15) $X \sim B(5, 1/6)$ $\boxed{2nd}$ $\boxed{\text{distr vars}}$ scroll down

(a) $P(X=3) = \text{binomialpdf}(5, 1/6, 3)$

$= 0.0322$

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

$= 1 - \text{binomialcdf}(5, 1/6, 2) = 0.0355$

(16) $X \sim N(32, 2.75^2)$

(a) $Z = \dfrac{35-32}{2.75} = 1.091$

(b) $P(X > 35) = P(Z > 1.091)$

$= \text{normalcdf}(1.091, 9) = \underline{\underline{0.138}}$

stands in for ∞

(c) $\text{invnorm}(0.9) = 1.282$

(d) $\text{invnorm}(0.25) = -0.6745 = Z$

$z = \dfrac{x - \mu}{\sigma}$

$-0.6745 = \dfrac{x - 32}{2.75} \Rightarrow x = \underline{\underline{30.1}}$