Section 9.1

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1.) a.) $S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$

b.) $A = \{HHH, HHT, HTH, THH\}$

c.) $B = \{HTT, THT, TTH, TTT\}$

2.) a.) $S = \{HH, HT, T1, T2, T3, T4, T5, T6\}$

b.) $A = \{T4, T5, T6\}$

c.) $B = \{HH\}$

3.) a.) $S = \{3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48\}$

b.) $A = \{12, 24, 36, 48\}$

c.) $B = \{9, 36\}$

4.) a.) $S = \{III, IIO, IIU, IOI, IUI, OII, UII, IOO, IOU, IUO, IUU, OIO, OIU, UIO, UIU, OOI, OUI, UOI, UUI, OOO, OOU, OUO, UOO, OUU, UOU, UUO, UUU\}$

b.) $A = \{III, IIO, IIU, IOI, IUI, OII, UII\}$

c.) $B = \{III, IIO, IIU, IOI, IUI, OII, UII, IOU, IUO, IUU,$

OIU, UIO, UIU, OUI, UOI, UUI,
OUU, UOU, UUO, UUU }

5.) $P(\text{Jane}) + P(\text{Larry}) + P(\text{Third}) = 1 \rightarrow$

$(0.29) + (0.47) + P(\text{Third}) = 1 \rightarrow$

$P(\text{Third}) = 0.24$

6.) a.) $P(\text{college}) = \frac{12+9}{72} = \frac{21}{72} = \frac{7}{24}$

b.) $P(\text{not college}) = \frac{32+19}{72} = \frac{51}{72} = \frac{17}{24}$

c.) $P(\text{girl, not college}) = \frac{32}{72} = \frac{4}{9}$

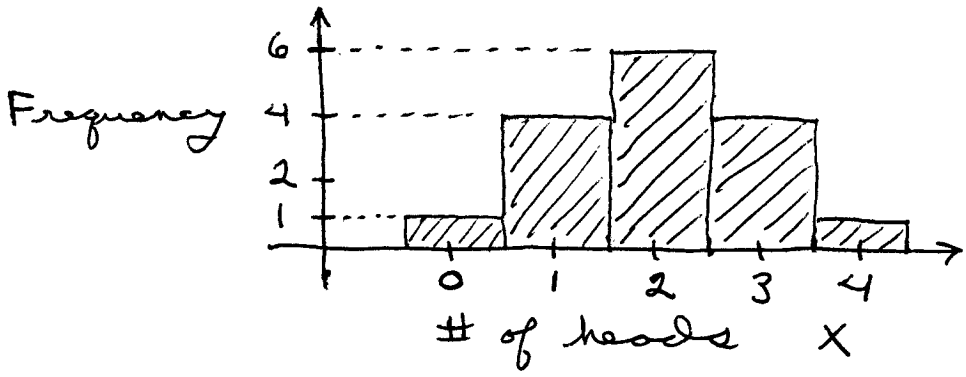
7.) $P(\text{both work}) + P(\text{1 work, 1 fail}) + P(\text{both fail}) = 1 \rightarrow$

$P(\text{at least 1 works}) + P(\text{both fail}) = 1 \rightarrow$

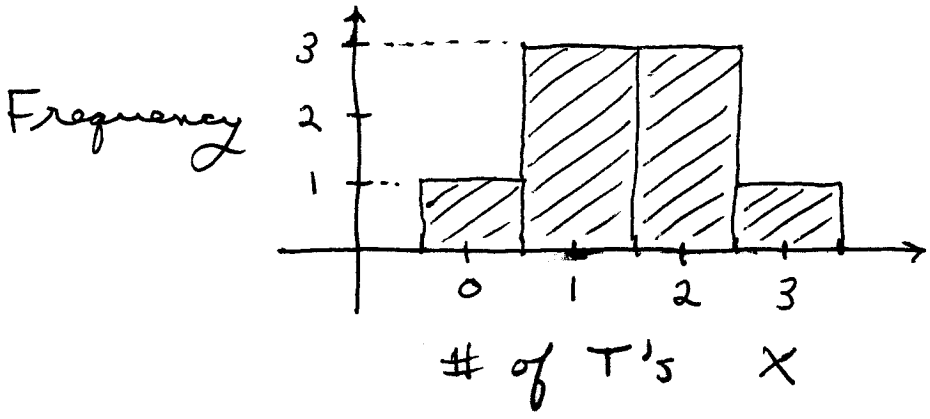
$0.9855 + P(\text{both fail}) = 1 \rightarrow$

$P(\text{both fail}) = \boxed{0.0145}$

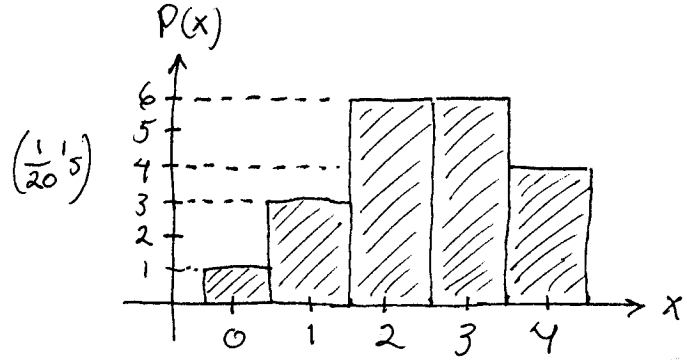
10.) $S = \{$HHHH, HHHT, HHTH, HTHH, THHH, HHTT, THHT, TTHH, HTHT, HTTH, THTH, HTTT, THTT, TTHT, TTTH, TTTT $\}$



11.) $S = \{TTT, TTF, TFT, FTT, TFF, FTF, FFT, FFF\}$



13.)



a.) $P(1 \le X \le 3)$

$= \frac{3}{20} + \frac{6}{20} + \frac{6}{20}$

$= \frac{15}{20} = \frac{3}{4}$

b.) $P(X \ge 2)$

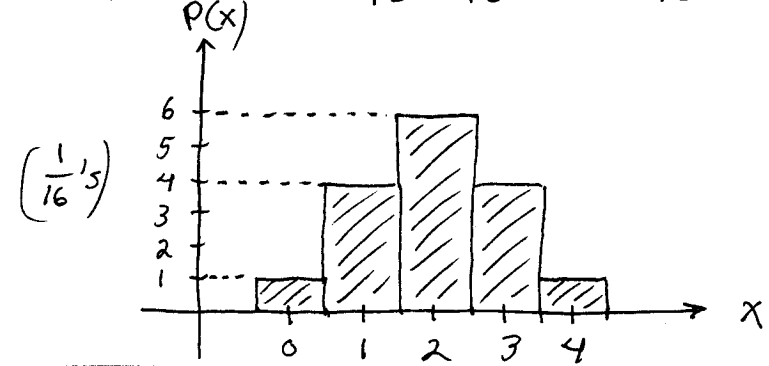
$= \frac{6}{20} + \frac{6}{20} + \frac{4}{20} = \frac{16}{20} = \frac{4}{5}$

17.) a.) $S = \{GGGG, GGGB, GGBG, GBGG, BGGG, GGBB, GBGB, BGGB, BGBG, BBGG, GBBG, GBBB, BGBB, BBGB, BBBG, BBBB\}$

b.)

# of girls x :	0	1	2	3	4
P(x) :	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{6}{16}$	$\frac{4}{16}$	$\frac{1}{16}$

c.)



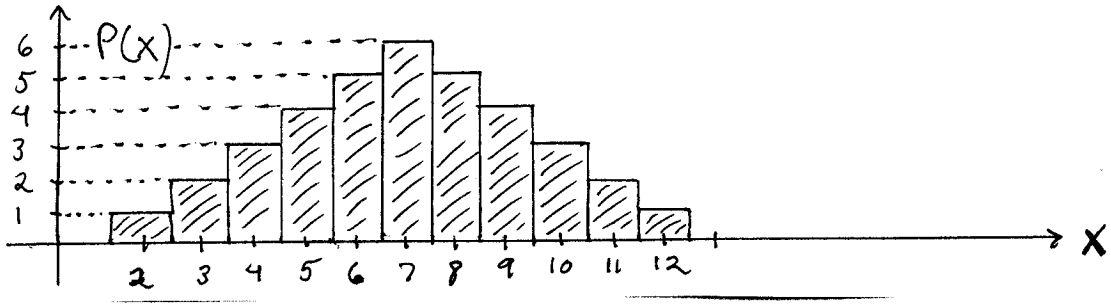
d.) $P(\text{at least 1 boy}) = \frac{1}{16} + \frac{4}{16} + \frac{6}{16} + \frac{4}{16} = \frac{15}{16}$

18.) a.) $S = \{(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6)\}$

b.)

sum x :	2	3	4	5	6	7	8	9	10	11	12
P(x) :	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

c.) $\left(\frac{1}{36}\text{'s}\right)$



d.) $P(5 \le x \le 9) = \frac{4}{36} + \frac{5}{36} + \frac{6}{36} + \frac{5}{36} + \frac{4}{36} = \frac{24}{36} = \frac{2}{3}$

22.) $\mu = E(x) = (1)\left(\frac{4}{10}\right) + (2)\left(\frac{2}{10}\right) + (3)\left(\frac{2}{10}\right) + (4)\left(\frac{1}{10}\right) + (5)\left(\frac{1}{10}\right)$

$= \frac{23}{10} = 2.3$;

$V(x) = (1-2.3)^2\left(\frac{4}{10}\right) + (2-2.3)\left(\frac{2}{10}\right) + (3-2.3)\left(\frac{2}{10}\right)$

$+ (4-2.3)^2\left(\frac{1}{10}\right) + (5-2.3)^2\left(\frac{1}{10}\right) = 1.81$;

$\sigma = \sqrt{V(x)} = \sqrt{1.81} \approx 1.345$

24.) $\mu = E(x) = (-5000)(.008) + (-2500)(.052)$

$+ (300)(.940) = \$112$;

$$V(x) = (-5000-112)^2(0.008) + (-2500-112)^2(0.052) + (300-112)^2(0.94) = 597,056 \;;$$

$$\sigma = \sqrt{V(x)} \approx \$772.69 \;.$$

25.) a.)

x:	1	2	3	4
$P(x)$:	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

$$\mu = E(x) = (1)\left(\tfrac{1}{4}\right) + (2)\left(\tfrac{1}{4}\right) + (3)\left(\tfrac{1}{4}\right) + (4)\left(\tfrac{1}{4}\right) = \frac{10}{4} = 2.5 \;;$$

$$V(x) = (1-2.5)^2\left(\tfrac{1}{4}\right) + (2-2.5)^2\left(\tfrac{1}{4}\right) + (3-2.5)^2\left(\tfrac{1}{4}\right) + (4-2.5)^2\left(\tfrac{1}{4}\right) = \frac{5}{4} = 1.25$$

b.) $S = \{(1,1), (1,2), (1,3), (1,4), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2), (3,3), (3,4), (4,1), (4,2), (4,3), (4,4)\}$

sum x:	2	3	4	5	6	7	8
$P(x)$:	$\frac{1}{16}$	$\frac{2}{16}$	$\frac{3}{16}$	$\frac{4}{16}$	$\frac{3}{16}$	$\frac{2}{16}$	$\frac{1}{16}$

$$\mu = E(x) = (2)\left(\tfrac{1}{16}\right) + (3)\left(\tfrac{2}{16}\right) + (4)\left(\tfrac{3}{16}\right) + (5)\left(\tfrac{4}{16}\right) + (6)\left(\tfrac{3}{16}\right) + (7)\left(\tfrac{2}{16}\right) + (8)\left(\tfrac{1}{16}\right) = \frac{80}{16} = 5 \;;$$

$$V(x) = (-3)^2\left(\tfrac{1}{16}\right) + (-2)^2\left(\tfrac{2}{16}\right) + (-1)^2\left(\tfrac{3}{16}\right) + (0)^2\left(\tfrac{4}{16}\right) + (1)^2\left(\tfrac{3}{16}\right) + (2)^2\left(\tfrac{2}{16}\right) + (3)^2\left(\tfrac{1}{16}\right) = \frac{40}{16} = 2.5 \;.$$

27.) a.) $\mu = E(x) = (10)(.25) + (15)(.3) + (20)(.25)$
$+ (30)(.15) + (40)(.05) = 18.5$ (1000's);

$V(x) = (10-18.5)^2(.25) + (15-18.5)^2(.3)$
$+ (20-18.5)^2(.25) + (30-18.5)^2(.15) + (40-18.5)^2(.05)$
$= 65.25$ so $\sigma = \sqrt{V(x)} = 8.1$.

b.) expected revenue = ($2.95)(expected sales)
$= (\$2.95)(18,500) = \$54,575$.

29.) $\mu = E(x) = (0)(0.995) + (30,000)(0.0036)$
$+ (60,000)(0.0011) + (90,000)(0.0003)$
$= \$201$ is the expected claim, so in order for company to break even, customers should be charged $201.

31.)

net $ gain x :	+$35	−$1
P(x) :	$\frac{1}{38}$	$\frac{37}{38}$

$$\mu = E(x) = (\$35)\left(\frac{1}{38}\right) + (-\$1)\left(\frac{37}{38}\right) = -\$.05 = -5¢$$

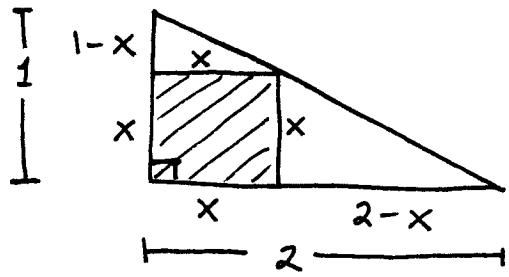
32.)

net $ gain x :	1st +$2948	2nd +$398	gifts +$18	lose −$2
P(x) :	$\frac{1}{3000}$	$\frac{1}{3000}$	$\frac{25}{3000}$	$\frac{2973}{3000}$

$$\mu = E(x) = (\$2948)\left(\frac{1}{3000}\right) + (\$398)\left(\frac{1}{3000}\right) + (\$18)\left(\frac{25}{3000}\right) + (-\$2)\left(\frac{2973}{3000}\right) = -\$.72 = -72¢$$

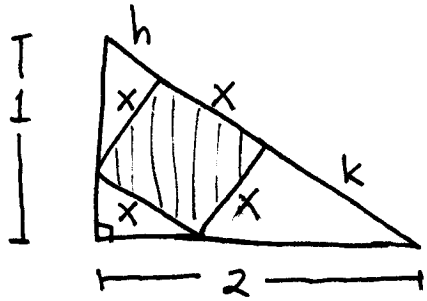
SA15:

By similar triangles:

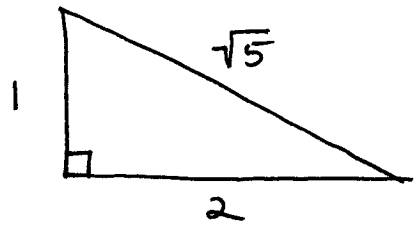


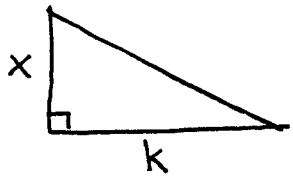
$\frac{1}{2} = \frac{x}{2-x} \rightarrow 2-x = 2x$

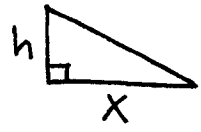
$\rightarrow 2 = 3x \rightarrow x = \frac{2}{3}$ and area of square is $\left(\frac{2}{3}\right)^2 = \frac{4}{9} \approx$ (0.44)



Label triangle as given and exhibit three similar triangles:







Then $\frac{1}{2} = \frac{x}{k} \rightarrow k = 2x$ and $\frac{1}{2} = \frac{h}{x} \rightarrow h = \frac{1}{2}x$ so that

$$h + x + k = \sqrt{5} \rightarrow \frac{1}{2}x + x + 2x = \sqrt{5}$$

$\rightarrow \frac{7}{2}x = \sqrt{5} \rightarrow x = \frac{2\sqrt{5}}{7}$ and area of square is $\left(\frac{2\sqrt{5}}{7}\right)^2 = \frac{20}{49} \approx$ (0.41)