

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.) $S = \{IIII, IIO, IIU, IOI, IUI, OII, OII, IOO, IOU, IUI, OIO, OIU, UIO, UIU, OOI, OUI, UOI, UUI, OOO, OOU, OUO, UOO, OUU, UOU, UUU\}$

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

c.) $B = \{IIII, IIO, IIU, IOI, IUI, OII, UII, IOU, IUI, IUI, OUI, UII, IOU, IUI, IUI, OUI, UII, IOU, IUI, IUI, OUI, UII\}$

$0111, 1110, 1111, 0111, 1101, 1111,$
 $0111, 1101, 1110, 1111 \}$

5.) $P(\text{Jane}) + P(\text{Larry}) + P(\text{Thirid}) = 1 \rightarrow$
 $(0.29) + (0.47) + P(\text{Thirid}) = 1 \rightarrow$
 $P(\text{Thirid}) = 0.24$

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

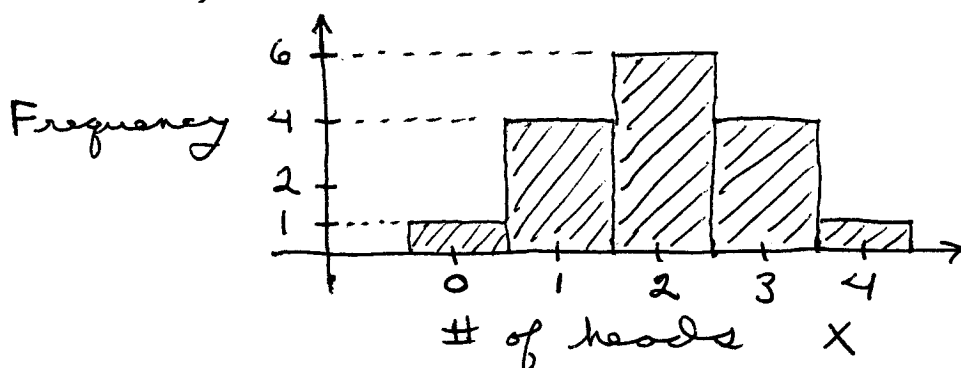
7.) $P(\text{both work}) + P(1 \text{ work, } 1 \text{ fail}) + P(\text{both fail}) = 1 \rightarrow$

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

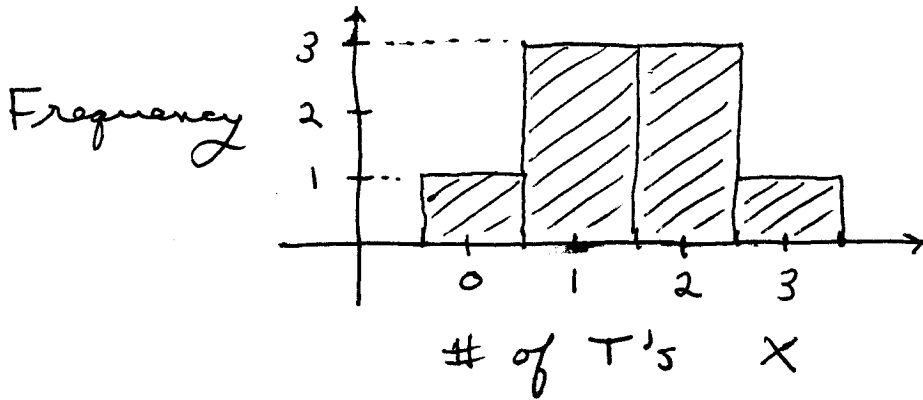
$0.9855 + P(\text{both fail}) = 1 \rightarrow$

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

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



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

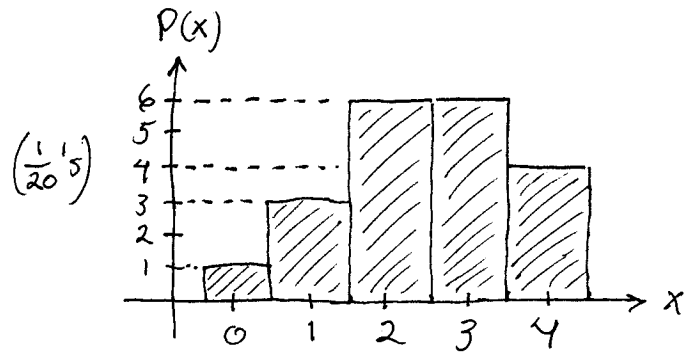


13.)

a.) $P(1 \leq x \leq 3)$

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

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



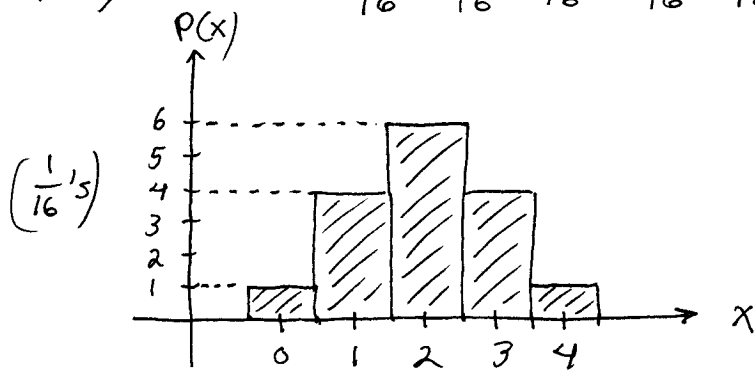
b.) $P(X \geq 2)$

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

17.) a.) $S = \{GGGG, GGGG, GGGB, GBGG, BGGG, GGGB, GBBB, BBGG, BBBG, BBBB\}$

b.) # of girls x : 0 1 2 3 4

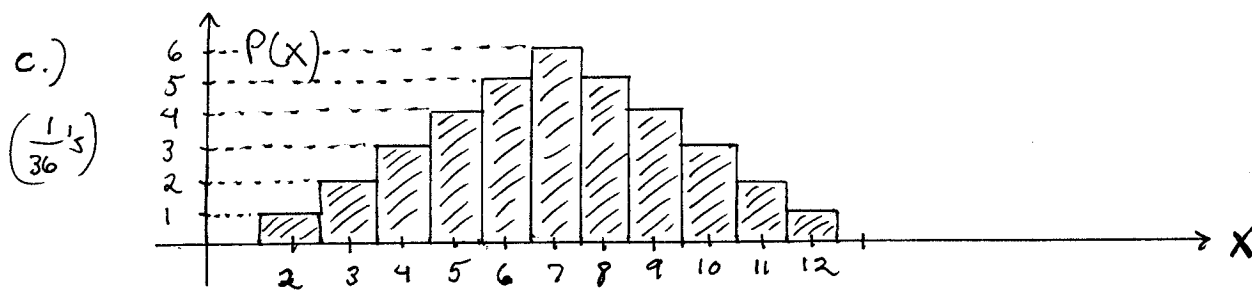
$$p(x) : \frac{1}{16} \quad \frac{4}{16} \quad \frac{6}{16} \quad \frac{4}{16} \quad \frac{1}{16}$$



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

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
 $P(x)$: $\frac{1}{36} \frac{2}{36} \frac{3}{36} \frac{4}{36} \frac{5}{36} \frac{6}{36} \frac{5}{36} \frac{4}{36} \frac{3}{36} \frac{2}{36} \frac{1}{36}$



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

22.) $\mu = E(x) = (1)\left(\frac{4}{10}\right) + (2)\left(\frac{2}{10}\right) + (3)\left(\frac{2}{10}\right) + (4)\left(\frac{1}{10}\right) + (5)\left(\frac{1}{10}\right)$
 $= \frac{23}{10} = 2.3$

$$V(x) = (1-2.3)^2\left(\frac{4}{10}\right) + (2-2.3)^2\left(\frac{2}{10}\right) + (3-2.3)^2\left(\frac{2}{10}\right) + (4-2.3)^2\left(\frac{1}{10}\right) + (5-2.3)^2\left(\frac{1}{10}\right) = 1.81$$

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

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.) $X: \quad 1 \quad 2 \quad 3 \quad 4$
 $P(X): \quad \frac{1}{4} \quad \frac{1}{4} \quad \frac{1}{4} \quad \frac{1}{4}$

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

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

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 $X: \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$

$$P(X): \quad \frac{1}{16} \quad \frac{2}{16} \quad \frac{3}{16} \quad \frac{4}{16} \quad \frac{3}{16} \quad \frac{2}{16} \quad \frac{1}{16}$$

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

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

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

$$V(x) = (10-18.5)^2(.25) + (15-18.5)^2(.3) + (20-18.5)^2(.25) + (30-18.5)^2(.15) + (40-18.5)^2(.05)$$

$$= 65.25 \quad \text{so} \quad \sigma = \sqrt{V(x)} = 8.1$$

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 .

$$\begin{array}{rcll}
 31.) & \text{net \$ gain } x : & +\$35 & -\$1 \\
 & P(x) & : & \frac{1}{38} \quad \frac{37}{38}
 \end{array}$$

$$\mu = E(x) = (\$35)\left(\frac{1}{38}\right) + (-\$1)\left(\frac{37}{38}\right) = -\$0.05 = -5¢$$

$$\begin{array}{rcll}
 32.) & & \text{1st} & \text{2nd} & \text{gifts} & \text{lose} \\
 \text{net \$ gain } x : & +\$2948 & +\$398 & +\$18 & & -\$2 \\
 P(x) & : & \frac{1}{3000} & \frac{1}{3000} & \frac{25}{3000} & \frac{2973}{3000}
 \end{array}$$

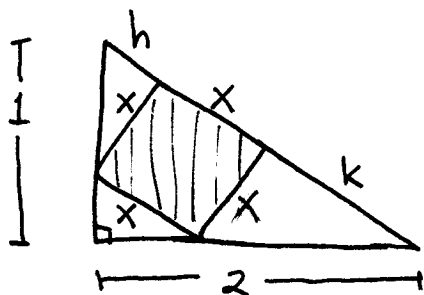
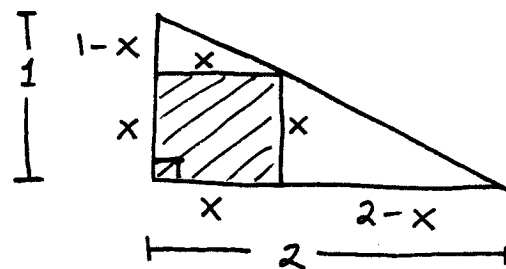
$$\begin{aligned}
 \mu = E(x) = & (\$2948)\left(\frac{1}{3000}\right) + (\$398)\left(\frac{1}{3000}\right) + (\$18)\left(\frac{25}{3000}\right) \\
 & + (-\$2)\left(\frac{2973}{3000}\right) = -\$0.72 = -72¢
 \end{aligned}$$

SA15:

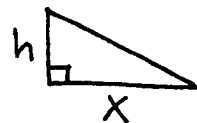
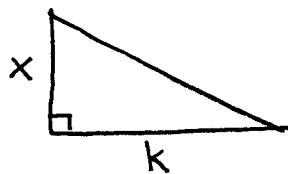
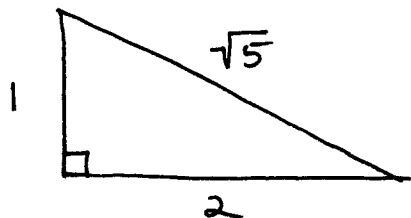
By similar triangles:

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

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



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

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

$$\rightarrow \frac{7}{2}x = \sqrt{5} \rightarrow x = \frac{2\sqrt{5}}{7} \text{ and area of}$$

$$\text{square is } \left(\frac{2\sqrt{5}}{7}\right)^2 = \frac{20}{49} \approx \boxed{0.41}$$