Page 14

x: education: average = 12.5 SD = 4

y: income: average = 19700 SD = 16000

$r = 0.35$

a) regression line for predicting income

$$\text{slope} = r \cdot \frac{SD_y}{SD_x} = 0.35 \cdot \frac{16000}{4} = 1400$$

$$\text{intercept} = \text{avg}_y - \text{slope} \cdot \text{avg}_x = 19700 - 1400 \cdot 12.5 = 2200$$

equation: **income = 2200 + 1400 · education**

b) income for men with 16 years of education:

$$2200 + 1400 \cdot 16 = \$24{,}600$$

c) income for men with 12 years of education:

$$2200 + 1400 \cdot 12 = \$19{,}000$$

difference: $\$24{,}600 - \$19{,}000 = \$5{,}600$

---

new parts:

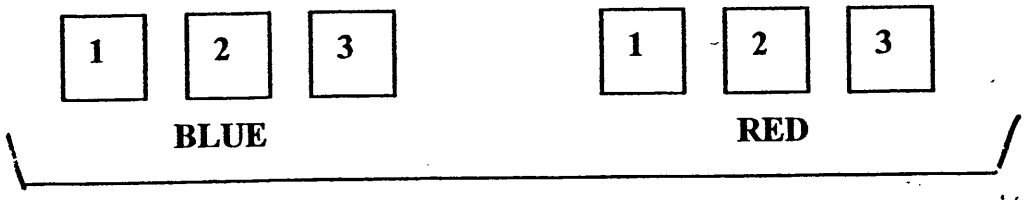
d) $$\text{r.m.s. error} = \sqrt{1 - r^2} \cdot SD_y = \sqrt{1 - 0.35^2} \cdot 16000$$

$$= \$14\,988$$

$$\approx \$15\text{ K}$$

(2)

eg One draw will be made at random from…

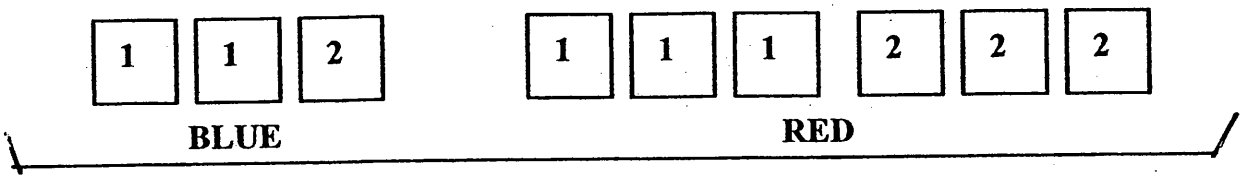


Are color and number independent?

if blue: chance for 1 : 1/3
2 : 1/3
3 : 1/3
} independent

if red: chance for 1 : 1/3
2 : 1/3
3 : 1/3

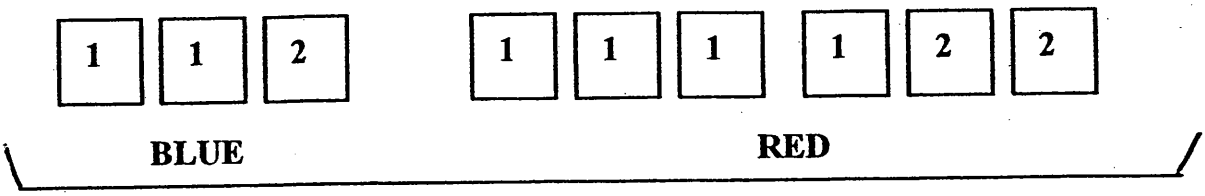
eg As above, for the box…



if blue: chance for 1 : 2/3
2 : 1/3
} not independent

if red: chance for 1 : 3/6 = 1/2
2 : 3/6 = 1/2

eg As above, for the box…

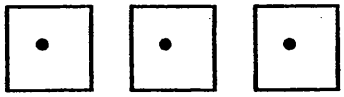


if blue: chance for 1 : 2/3
2 : 1/3
} independent

if red: chance for 1 : 4/6 = 2/3
2 : 2/6 = 1/3

(3)

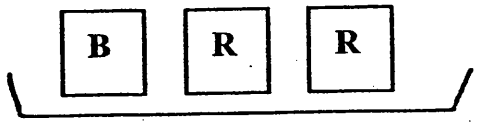
eg roll 3 dice

a) What's the chance of getting  ? $\frac{1}{216}$

b) What's the chance of getting no  ? $\left(\frac{5}{6}\right)^3 = \frac{125}{216}$

c) What's the chance of getting at least one  ? $1 - \frac{125}{216} = \frac{91}{216}$

eg Draw 2 tickets with replacement from…



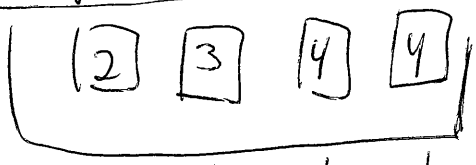
What is the chance they are the same color?

BB or RR

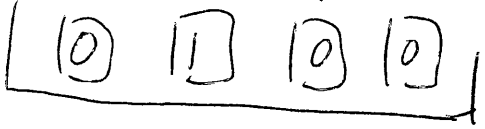
$\frac{1}{3} \cdot \frac{1}{3} + \frac{2}{3} \cdot \frac{2}{3} = \frac{1}{9} + \frac{4}{9} = \frac{5}{9}$

Page 19 (middle): (4)

2 tickets (with replacement) from box



Change to box ↓even ↓odd ↓even ↓even



sum is odd if

first even, second odd: $\frac{3}{4} \cdot \frac{1}{4} = \frac{3}{16}$

or first odd, second even: $\frac{1}{4} \cdot \frac{3}{4} = \frac{3}{16}$

$\Big\} = \frac{6}{16} = \frac{3}{8}$

---

same box, without replacement:

first even, second odd: $\frac{3}{4} \cdot \frac{1}{3} = \frac{3}{12} = \frac{1}{4}$

or first odd, second even: $\frac{1}{4} \cdot \frac{3}{3} = \frac{3}{12} = \frac{1}{4}$

$\Big\} = \frac{2}{4} = \frac{1}{2}$

Review Question #11, p. 306 (Chapter 7)

only interested in positive numbers in box:

original box

-2	-1	0	1	3

becomes

0	0	0	1	3

number of draws = 100

box average: $\frac{0+0+0+1+3}{5} = \frac{4}{5}$

box SD $= \sqrt{\frac{3\cdot|0-4/5|^2 + |1-4/5|^2 + |3-4/5|^2}{5}}$

$= \sqrt{\frac{3\cdot\frac{16}{25} + \frac{1}{25} + \frac{121}{25}}{5}}$

$= \sqrt{\frac{48+1+121}{125}}$

$= \sqrt{\frac{170}{125}} = \sqrt{1.36} \approx 1.166$

$[\approx 1.2]$

$EV_{sum} = 100 \cdot \frac{4}{5} = 80$

$SE_{sum} = \sqrt{100} \cdot 1.166 = 10 \cdot 1.166 = 11.66$

$[\sqrt{100} \cdot 1.2 = 10 \cdot 1.2 = 12]$

Box Model, EV, SE, & Normal Curve

In Stat 1040, 25% students are male.
We randomly select 50 students
What is the chance that less than 5 students are male?

a) box model: male = 1
female = 0

| 25 × 1 | 75 × 0 |

number of draws = 50

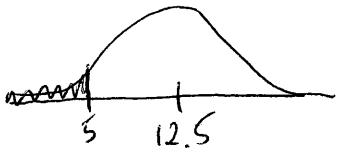
b) box avg $= \frac{25}{100} = 0.25 = 25\%$

box SD $= \sqrt{\frac{25}{100} \cdot \frac{75}{100}} = \sqrt{0.25 \cdot 0.75} = \sqrt{0.1875}$
$= 0.433$

$EV_{sum} = 50 \cdot 0.25 = 12.5$

$SE_{sum} = \sqrt{50} \cdot 0.433 = 3.06$

c)



SU: $\frac{5 - 12.5}{3.06} = \frac{-7.5}{3.06} = -2.45$

area between -2.45 to 2.45: 98.57%

area below -2.45: $\frac{100\% - 98.57\%}{2} = \frac{1.43\%}{2} = 0.715\%$