

Exercise 4.5

$$\begin{aligned} \textcircled{4} \text{ a) } P(a) &= p(s) - p(b) - p(c) - p(d) - p(e) - p(f) \\ &= 1 - 0.3 - 0.15 - 0.05 - 0.2 - 0.13 \\ &= 0.17 \end{aligned}$$

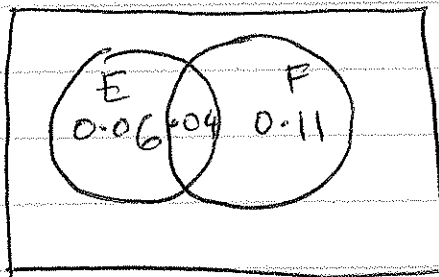
$$\begin{aligned} \textcircled{4} \text{ b) } P(E) &= p\{a, b, c\} \\ &= p(a) + p(b) + p(c) \\ &= 0.17 + 0.3 + 0.15 = 0.62 \end{aligned}$$

$$\begin{aligned} \text{c) } P(F) &= p\{c, d, e, f\} \\ &= p(c) + p(d) + p(e) + p(f) \\ &= 0.15 + 0.05 + 0.2 + 0.13 = 0.53. \end{aligned}$$

$$\begin{aligned} \textcircled{6} \text{ Since } p(a) + p(b) + p(c) &= p(s) = 1 \\ p(a) &= 2p(b) = 3p(c) \\ p(a) + \frac{1}{2}p(a) + \frac{1}{3}p(a) &= 1. \\ p(a) &= \frac{6}{11}. \end{aligned}$$

$\textcircled{13}$ solution in student solⁿ manual.

$\textcircled{26}$



$E = \{\text{sale at 1st stop}\}$

$F = \{\text{sale at 2nd stop}\}$

$$\begin{aligned} p(E) &= 0.10 & p(E \cap F) &= 0.04 \\ p(F) &= 0.15 \end{aligned}$$

a) the first stop

$$P(E) = 0.1 = \frac{1}{10} = \frac{a}{a+b}$$

$$\begin{aligned} a &= 1 & a+b &= 10 \\ b &= 9 \end{aligned}$$

$\therefore$ odds are 1:9.

(9)

b) on second stop $= P(F) = 0.15 = \frac{3}{20}$

$$a = 3 \quad a + b = 20 \therefore b = 17$$

$$\therefore \text{odds are } 3:17$$

c) $P(1 \cap 2) = 0.04 = \frac{4}{100} = \frac{1}{25}$ $a = 1 \quad a + b = 25$
 $b = 24.$

$$\therefore \text{odds are } 1:24.$$

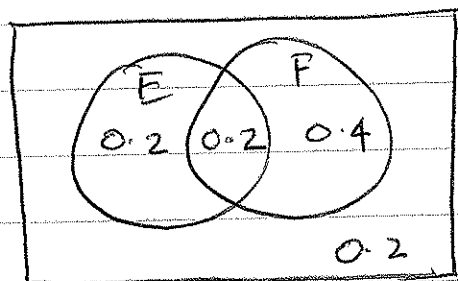
(28) Odds of successful marriage are 1:2

$$a = 1 \quad b = 2$$

$$P(\text{successful marriage}) = \frac{a}{a+b} = \frac{1}{1+2} = \frac{1}{3}.$$

Exercise 4.6.

(10) $P(E) = 0.4 \quad P(F) = 0.6 \quad P(E \cap F) = 0.2$



a) $P(E|F^c)$

Read it as "Probability of E given F complement"

$$P(E|F^c) = \frac{P(E \cap F^c)}{P(F^c)} = \frac{0.2}{0.4} = 0.5$$

$$P(E \cap F^c) = 0.2$$

$$P(F^c) = 0.4.$$

$$\textcircled{106} \quad P(F|E^c) = \frac{P(F \cap E^c)}{P(E^c)} = \frac{0.4}{0.6} = \frac{2}{3} \quad \textcircled{10}$$

$$P(F \cap E^c) = 0.4$$

$$P(E^c) = 0.6$$

$$\textcircled{12} \quad a) \quad P(F|E \cap F) = \frac{P(F \cap E \cap F)}{P(E \cap F)} = \frac{P(E \cap F)}{P(E \cap F)} = 1.0$$

$$b) \quad P(E^c|E) = \frac{P(E^c \cap E)}{P(E)} = \frac{0}{P(E)} = 0.$$

$\textcircled{24}$ Coin is flipped 4 times

$E = \{\text{Head occurs exactly 3 times}\}$

$F = \{\text{Head occurs at least 2 times}\}$

At least two times means (2 heads or 3 heads or 4 heads)

$$F = \{C(4,2) + C(4,3) + C(4,4)\} = \#n(E) = 11$$

$$\text{Total sample space} = n(s) = 2^4 = 16.$$

$$E = \{C(4,3)\} \Rightarrow n(E) = 4.$$

$$P(E) = \frac{4}{16} \quad P(F) = \frac{11}{16}$$

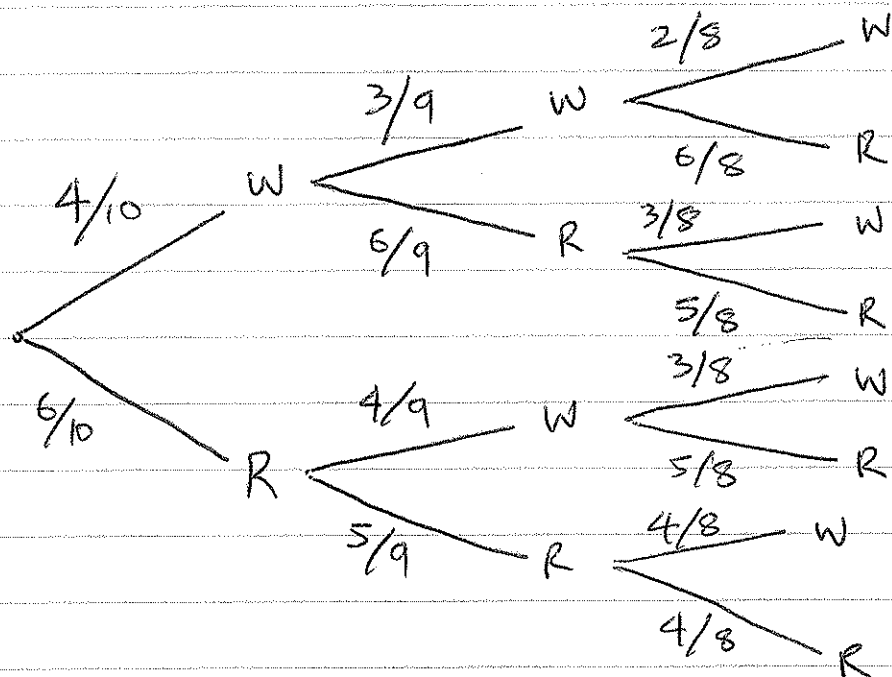
$$P(E \cap F) = \frac{4}{16}$$

$$P(E|F) = \frac{P(E \cap F)}{P(F)} = \frac{4/16}{11/16} = \frac{4}{11}$$

(26)

Urn has 4 white & 6 Red ball.

(11)



Remember that every draw reduces the number of total balls in the urn. Depending on which ball is removed, the count for that particular colored ball reduces.

(A) $E = \{ \text{Event that the Red ball is drawn on third draw} \}$

$E = \{ WWR, WRR, RRR, RWR \}$

So we must read it as

white & white & Red OR white & Red & Red OR Red & Red & Red
OR Red & white & Red

$$P(E) = \left(\frac{4}{10}\right)\left(\frac{3}{9}\right)\left(\frac{6}{8}\right) + \left(\frac{4}{10}\right)\left(\frac{6}{9}\right)\left(\frac{5}{8}\right) + \left(\frac{6}{10}\right)\left(\frac{5}{9}\right)\left(\frac{4}{8}\right) + \left(\frac{6}{10}\right)\left(\frac{4}{9}\right)\left(\frac{5}{8}\right)$$

$$= 0.6.$$

(B)

$F_2 = \{ \text{At least one ball draw in the 1st two draws is Red} \}$

$F_2 = \{ WRW, WRR, RWW, RWR, RRW, RRR \}$

$$\left(\frac{4}{10}\right)\left(\frac{6}{9}\right)\left(\frac{3}{8}\right) + \left(\frac{4}{10}\right)\left(\frac{6}{9}\right)\left(\frac{5}{8}\right) + \left(\frac{6}{10}\right)\left(\frac{4}{9}\right)\left(\frac{3}{8}\right) + \left(\frac{6}{10}\right)\left(\frac{4}{9}\right)\left(\frac{4}{8}\right)$$

$$+ \left(\frac{6}{10}\right)\left(\frac{5}{9}\right)\left(\frac{4}{8}\right) + \left(\frac{6}{10}\right)\left(\frac{5}{9}\right)\left(\frac{4}{8}\right) = 0.8333$$

$$P(F|E) = \{ WRR, RWR, RRR \}$$

$$= \left\{ \left(\frac{4}{10}\right)\left(\frac{6}{9}\right)\left(\frac{5}{8}\right) + \left(\frac{6}{10}\right)\left(\frac{4}{9}\right)\left(\frac{5}{8}\right) + \left(\frac{6}{10}\right)\left(\frac{5}{9}\right)\left(\frac{4}{8}\right) \right\}$$

$$= 0.4815$$

$$P(E|F) = \frac{P(E \cap F)}{P(F)} = \frac{0.4815}{0.8333}$$

$$= 0.5778$$

$$(28) \quad P(A|E) = P(\frac{E|A}{A|E}) \cdot P(E) = (0.2)(0.6) = 0.12$$

$$P(A) = (0.6)(0.2) + (0.4)(0.3) = 0.24$$

$$P(A|E) = \frac{P(A \cap E)}{P(E)} = \frac{0.12}{0.6} = 0.2$$

(34)

$$P(E \cap F) = P(E) \times P(F)$$

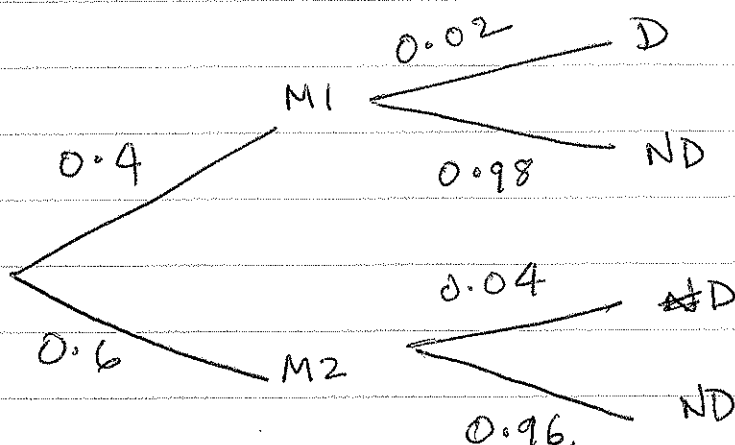
$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

$$= P(E) + P(F) - P(E) \times P(F)$$

$$= 0.4 + 0.6 - 0.4 \times 0.6 = 0.76.$$

(13)

(38)

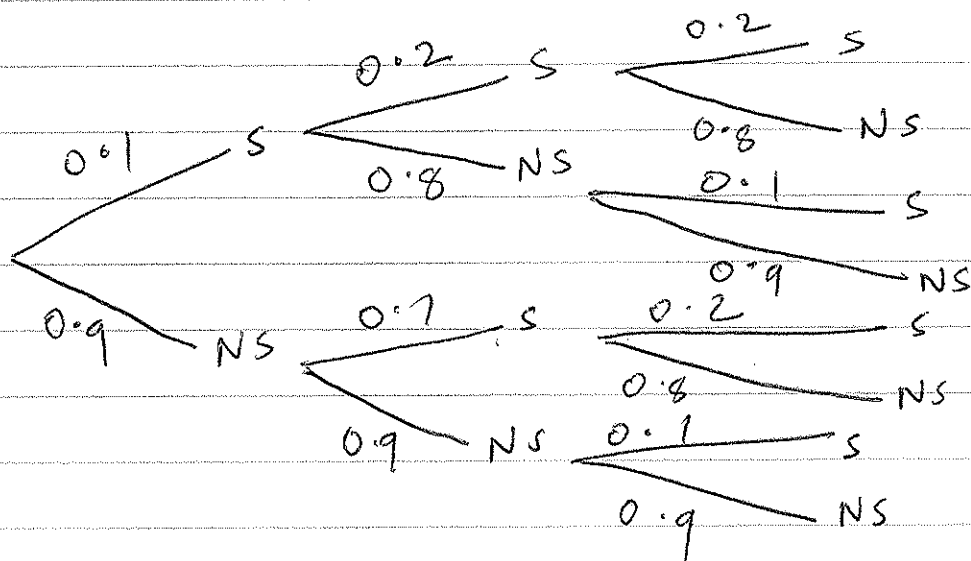


$$a) P(D|M_1) = \frac{P(D \cap M_1)}{P(M_1)} = \frac{(0.4)(0.02)}{0.4} = 0.02$$

$$b) P(D|M_1) + P(D|M_2) = (0.4)(0.02) + (0.6)(0.04)$$

$$= 0.032$$

(42)



$$\text{Event} = \{SSS, SSNS, SNSS, NSSS\}$$

$$(0.1)(0.2)(0.2) + (0.1)(0.2)(0.8) + (0.1)(0.8)(0.1) + (0.9)(0.1)(0.2) = 0.046$$

48

	Collapse	Not collapse (complement)
Elder Bridge	0.15	0.85
Younger "	0.05	0.95
Ancient	0.20	0.80

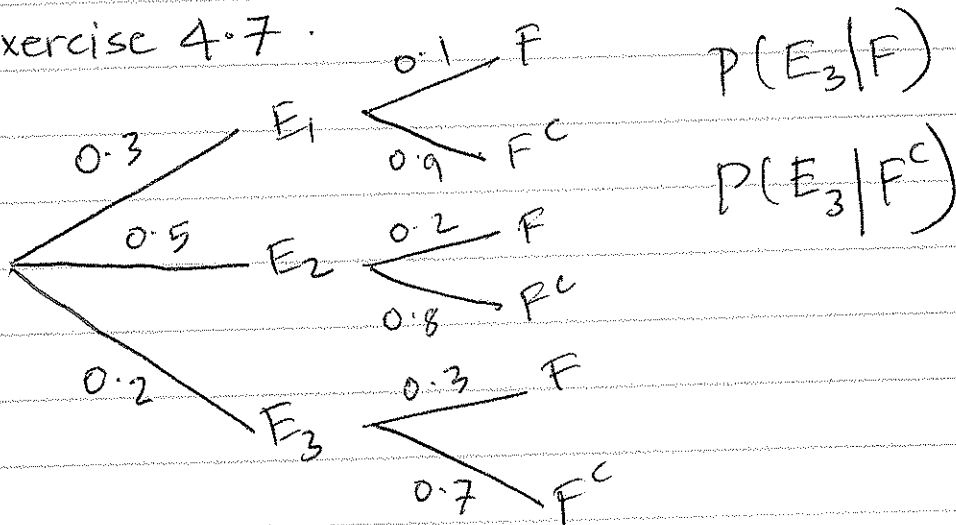
Exactly one bridge collapses

$$(E \cap Y^c \cap A^c) + (Y \cap E^c \cap A^c) + (A \cap E^c \cap Y^c)$$

$$(0.15)(0.95)(0.8) + (0.05)(0.85)(0.8) + (0.2)(0.85)(0.95) = 0.3095$$

Exercise 4.7.

4



$$P(E_3|F) = \frac{P(E_3 \cap F)}{P(E_1) \cdot P(F|E_1) + P(E_2) \cdot P(F|E_2) + P(E_3) \cdot P(F|E_3)}$$

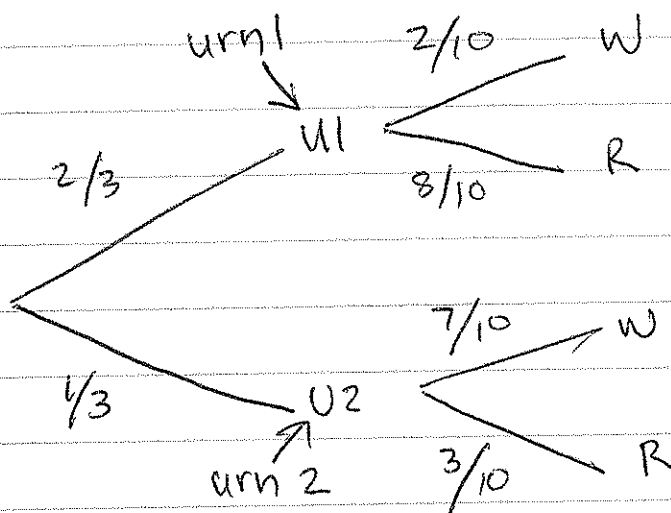
15

$$= \frac{(0.2)(0.3)}{(0.3)(0.1) + (0.5)(0.2) + (0.2)(0.3)} = 0.3158.$$

$$P(E_3|F^c) = \frac{P(E_3 \cap F^c)}{P(E_1) \cdot P(F^c|E_1) + P(E_2) \cdot P(F^c|E_2) + P(E_3) \cdot P(F^c|E_3)}$$

$$= \frac{(0.2)(0.7)}{(0.3)(0.9) + (0.5)(0.8) + (0.2)(0.7)} = 0.1728.$$

⑧



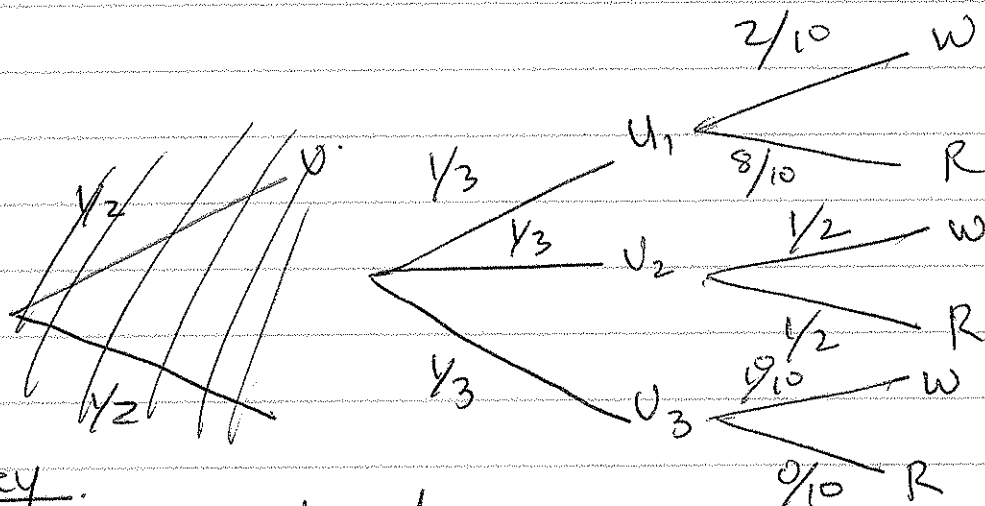
$$P(U1|W) = \frac{P(U1 \cap W)}{P(U1) \cdot P(W|U1) + P(U2) \cdot P(W|U2)}$$

$$= \frac{(2/3)(2/10)}{(2/3)(2/10) + (1/3)(7/10)} = 0.3636.$$

$$P(U_2|W) = \frac{P(U_2 \cap W)}{P(U_1) \cdot P(W|U_1) + P(U_2) \cdot P(W|U_2)}$$

$$= \frac{(\frac{1}{3})0.7}{(\frac{2}{3})(0.2) + (\frac{1}{3})(0.7)} = 0.6363.$$

(12)



Key.

Ball was replaced.

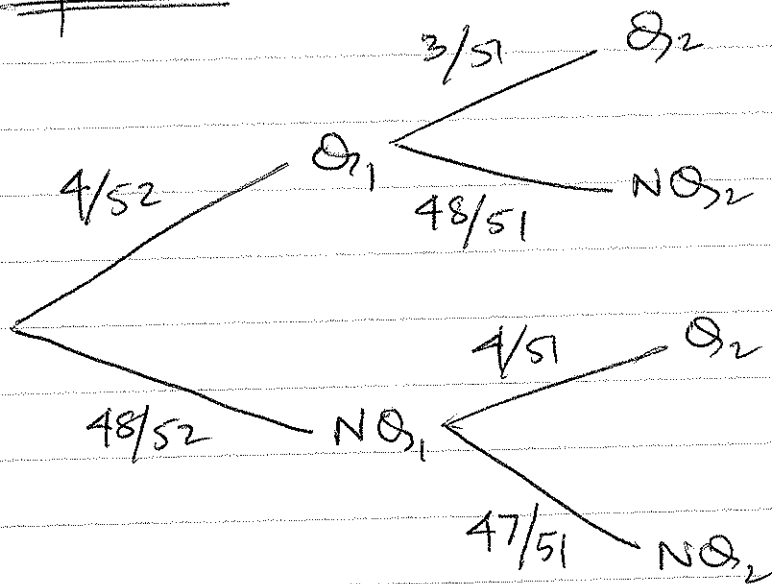
$$P(U_1|W) = \frac{P(U_1) \cdot P(W|U_1)}{P(U_1) \cdot P(W|U_1) + P(U_2) \cdot P(W|U_2) + P(U_3) \cdot P(W|U_3)}$$

$$= \frac{(\frac{1}{3})(\frac{2}{10})(\frac{2}{10})}{(\frac{1}{3})(\frac{2}{10})^2 + (\frac{1}{3})(\frac{1}{2})^2 + (\frac{1}{3})(1)^2} = 0.031007$$

$$P(U_2|W) = \frac{P(U_2) \cdot P(W|U_2)}{P(U_1) \cdot P(W|U_1) + P(U_2) \cdot P(W|U_2) + P(U_3) \cdot P(W|U_3)}$$

$$= \frac{(\frac{1}{3})(0.5)^2}{(\frac{1}{3})(0.2)^2 + (\frac{1}{3})(0.5)^2 + (\frac{1}{3})(1)^2} = 0.1938.$$

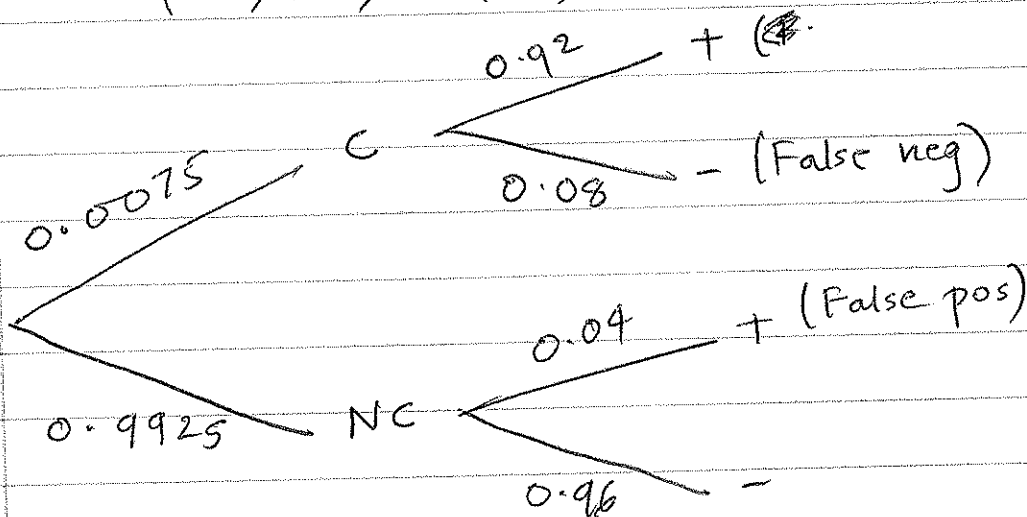
(18) Two cards in succession without
replacement



$$P(Q_1 | NOT Q_2) = \frac{P(Q_1 \cap NOT Q_2)}{P(Q_1) \cdot P(NOT Q_2 | Q_1) + P(NOT Q_1) \cdot P(NOT Q_2 | NOT Q_1)}$$

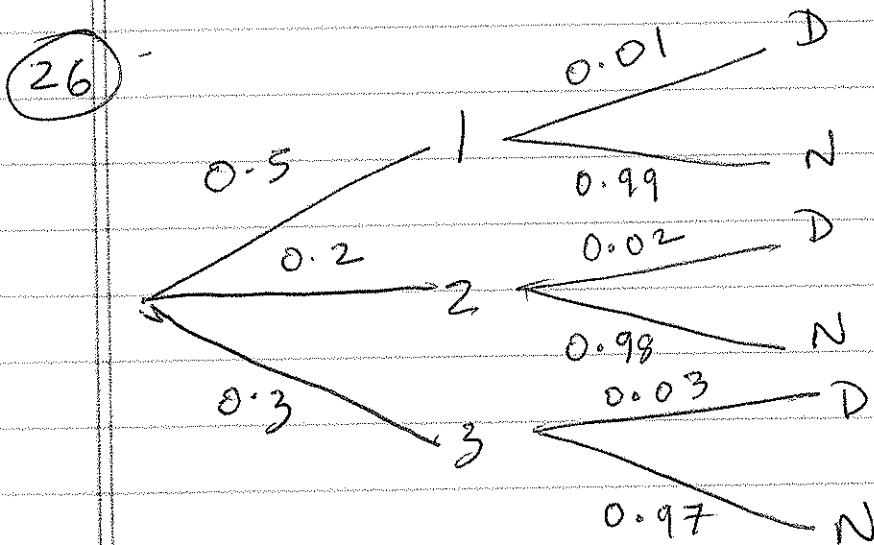
$$= \frac{\left(\frac{4}{52}\right)\left(\frac{48}{51}\right)}{\left(\frac{4}{52}\right)\left(\frac{48}{51}\right) + \left(\frac{48}{52}\right)\left(\frac{47}{51}\right)} = 0.07843$$

(24)



Test shows negative

$$\begin{aligned}
 P(NC|-) &= \frac{P(NC|-)}{P(C) \cdot P(-|C) + P(NC) \cdot P(-|NC)} \\
 &= \frac{(0.9925)(0.96)}{(0.0075)(0.08) + (0.9925)(0.96)} \\
 &= \underline{0.9993}
 \end{aligned}$$



$$\begin{aligned}
 P(E_1|N) &= \frac{P(E_1|NN)}{P(1) \cdot P(N|1) + P(2) \cdot P(N|2) + P(3) \cdot P(N|3)} \\
 &= \frac{(0.5)(0.99)}{(0.5)(0.99) + (0.2)(0.98) + (0.3)(0.97)} \\
 &= 0.5041.
 \end{aligned}$$

30 D - Defective

$\bar{D}$ - Not Defective.

19.

The probability that the randomly selected box is the one which has 10 defective transistors given that one of the two transistor picked was defective is

Let B - The box with 10 def transistors

G - The other boxes.

$$P(B|D\bar{D}) = \frac{P(B \cap D\bar{D})}{P(B) \cdot P(D\bar{D}|B) + P(G) \cdot P(D\bar{D}|G)}$$

$$= \frac{(0.1) \cdot \frac{C(10,1) \cdot C(90,1)}{C(100,2)}}{(0.1) \cdot \frac{C(10,1) \cdot C(90,1)}{C(100,2)} + 0.9 \cdot \frac{C(1,1) \cdot C(99,1)}{C(100,2)}}$$

$$= 0.503.$$

40

Sales man can see his customers

$$C(10,4) \times C(8,3) \times C(6,4) = 210 \times 56 \times 15 = 176,400$$

42

First consider the number of ways of getting 3 of a kind. choose any kind to be the '3 of a kind' then assign any three of the 4 suits to the kind selected

$$N_1 = C(13,1) \times C(4,3) = 13 \times 4 = 52$$

Then the other two of a kind can be selected as follows: First choose any one kind other than the one selected, then assign any two of the four suits to the kind selected

$$N_2 = C(12,1) \times C(4,2) = 12 \times 6 = 72$$

$$\text{Total ways } N_1 \times N_2 = 52 \times 72 = 3744.$$

44

Select 2 boys & 2 girls

$$N_1 = C(8,2) \times C(4,2) = 28 \times 6 = 168.$$

There are 2 ways of making different pairs for the selected boys & girls

$$N_2 = N_1 \times 2 = 168 \times 2 = 336.$$

Exercise 5.3

②

The size of the sample is $C(10,5)$. The size of the event; '3 white & 2R balls'

$$C(4,3) \times C(6,2)$$

$$P = \frac{C(4,3) \times C(6,2)}{C(10,5)} = \frac{4 \times 15}{252} = \frac{5}{21}$$

The probability that at least 3 are white is

$$P = \frac{C(4,3) \times C(6,2) + C(4,4) \times C(6,1)}{C(10,5)} = \frac{60+6}{252} = \frac{11}{42}$$

(10) sample space is $C(52,2) = 1326$.

$$P = \frac{C(4,1) \times C(13,2)}{C(52,2)} = \frac{4 \times 78}{1326} = \frac{4}{17}$$

(12) No face card = $52 - (4 \times 3) = 40$

$$P = \frac{C(40,2)}{C(52,2)} = \frac{20 \times 39}{26 \times 51} = \frac{10}{17}$$

(14) Sample space $C(52,5)$

Total number of straight flushes $C(9,1) \times C(4,1) = 36$

$$P = \frac{36}{C(52,5)} = 1.36 \times 10^{-5}$$

(16) Total number of full houses is $C(13,1) \times C(4,3) \times C(12,1) \times C(4,2)$

First select the kind and assign it with any three suits we have $C(13,1) \times C(4,3)$

Then select the kind ~~of~~ from the rest of the 12 and assign it with any two suits number of choices are $C(12,1) \times C(4,2)$

So the probability of obtaining 3 of a kind is.

(25)

$$P = \frac{C(13,1) \times C(4,3) \times C(49,2)}{C(52,5)} \approx 0.024.$$

(26)
$$P = \frac{C(10,3)}{C(20,3)} = \frac{120}{1140} = \frac{2}{19}.$$

(32) The number of ways for 3 stocks to move up, 15 to stay the same & 2 to move down in 20-stock mutual fund is the ordered partition of type (3, 15, 2):

$$N = \binom{20}{3, 15, 2} = \frac{20!}{3! \times 15! \times 2!} = 155040 \text{ ways.}$$

(38) a) Since a_1, a_2, b_1, b_2, b_3 are mutually distinct the number of arrangements is then equal to the number of permutations of these 5 letters
$$N = P(5, 5) = 120.$$

b) For the word $aab_1b_2b_3$, first pick from the 5 available positions 3 "seats" for $b_1, b_2, \& b_3$ the rest 2 "seats" go to a's. Then as the permutation of $b_1, b_2 \& b_3$ makes another different word while permutations of the a's do not give any new words
Hence
$$N = C(5, 3) \cdot P(3, 3) = P(5, 3) = 60.$$

② For the word aabbbb the number of arrangements is $N = c(5, 2) = 10$.

26

Exercise 5-4.

8, 16, 18, 20, 24.

⑧ $c(6, 4) (0.5)^4 (1 - 0.5)^{6-4} = 15 \times 0.0625 \times 0.25$
 ≈ 0.243 .

⑩ $\frac{c(10, 7) + c(10, 8) + c(10, 9) + c(10, 10)}{2^{10}} = 0.172$

⑱ $c(10, 1) (0.5)^1 (0.5)^{9-1} + c(10, 2) (0.5)^2 (0.5)^{8-2}$
 $= 0.0537$.

⑳ $P(\text{Exactly 3 times}) = c(7, 3) (0.6)^3 (0.4)^{7-3} = 0.194$.

㉔ $c(n, n-k) (1-p)^{n-k} \cdot p^k = c(n, k) p^k (1-p)^{n-k}$.

Chapters. 6.1, 6.2, 6.3, 6.4.

①

There could be Typos & error. Use this as a guide not for exact answers

6.1

2) Finite discrete

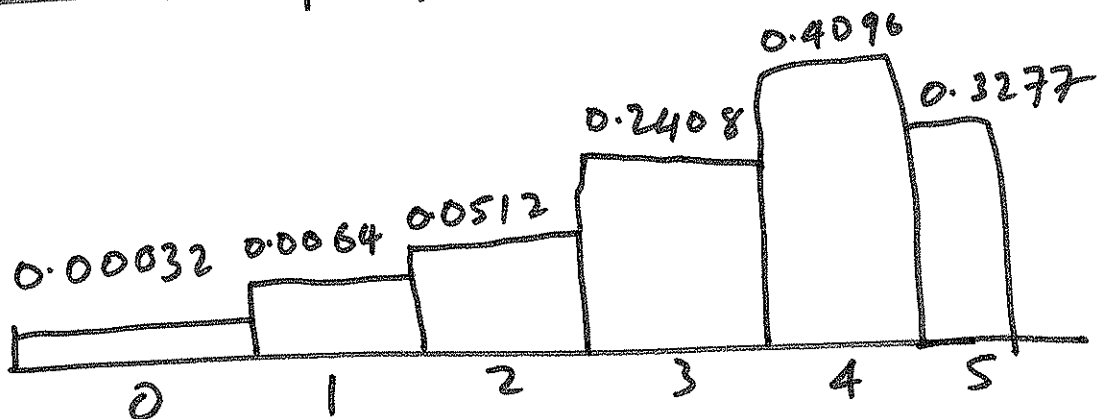
3) Infinite discrete

10)

Event	No hit	Single	Double	Triple	H.R
Random Variable x	0	1	2	3	4
Freq	431	78	16	4	61
$P(X=x)$	0.731	0.132	0.027	0.007	0.103

12)

Random Var x	0	1	2	3	4	5
$P(X=x)$	0.00032	0.0064	0.0512	0.2048	0.4096	0.3277



18)

R.V. x	0	1
$P(X=x)$	$8/15$	$7/15$

(2)

20)

a) 0.05

b) 0.40

c) 0.65

d) 0.60

6.2.

16) $1 - 50,000$

$5 - 5,000$

$10 - 1,000$

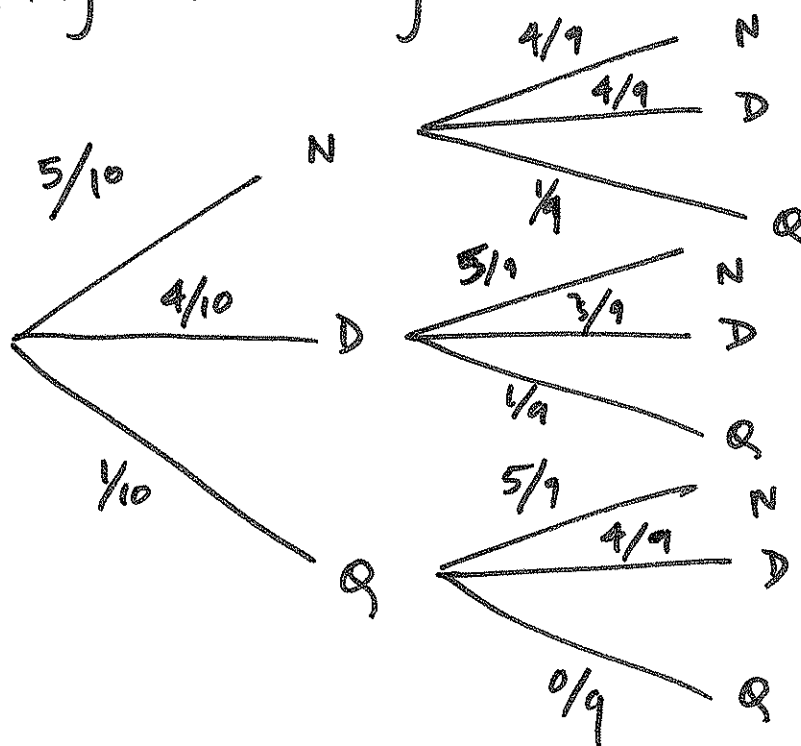
$$\frac{100 - 10}{116}$$

49999	$1/100,000$
4999	$5/100,000$
999	$10/100,000$
9	$100/100,000$

$$\begin{aligned}
 E(X) &= 49,999 \left(\frac{1}{100,000} \right) + 4999 \left(\frac{5}{100,000} \right) + 999 \left(\frac{10}{100,000} \right) \\
 &\quad + 9 \left(\frac{100}{100,000} \right) - 1 \left(\frac{99,884}{100,000} \right) \\
 &= -\$0.14.
 \end{aligned}$$

18) Using Tree diagram

(3)



outcome X	10	15	20	30	35
$P(X=x)$	$2/9$	$4/9$	$2/15$	$1/9$	$4/45$

$$E(X) = 10\left(\frac{2}{9}\right) + 15\left(\frac{4}{9}\right) + 20\left(\frac{2}{15}\right) + 30\left(\frac{1}{9}\right) + 35\left(\frac{4}{45}\right)$$

$$= \$0.18$$

26) We have

$$1.2 = np = 6p$$

$$\text{Thus } p = 1.2/6 = 0.2$$

$$30) \text{ Mean} = (55 + 55 + 60 + 70 + 75 + 75 + 80) / 7$$

$$= \cancel{195} 67.1$$

$$\text{Median} = (\cancel{3} + \cancel{5}) / 2 = \cancel{4} 70$$

$$\text{Mode} = 55, \text{ and } 75$$

$$32) E(X) = \$700(0.95) - (10,000 - 700) \cdot 0.05$$

$$= \$200.$$

6.3.

23) Using calculator

G	S
$\mu = 789.33$	95.167
$\sigma = 86.78$	23.67
$\text{Var} = 7530.76$	560.26

G varies the most

Abortion	Child birth
$\mu = 0.6$	7.76
$\sigma = 0.167$	0.083
$\text{Var} = 0.028$	0.287

Childbirth is
Varying most

31) Carbon Monoxide

$\mu = 6.48$

$\sigma = 0.402$

$\text{Var} = 0.1616$

Ozone

0.124

0.0102

0.000104

CO varies most

32) Sulphur dioxide

$\mu = 8.6$

$\sigma = 0.49$

$\text{Var} = 0.24$

Nitrogen Dioxide

$\mu = 23.4$

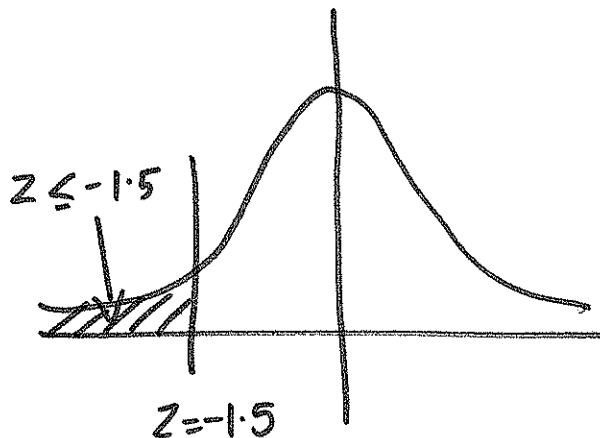
$\sigma = 4.58 \quad 0.64$

$\text{Var} = 20.975 \quad 0.8$

Nitrogen dioxide varying most

6.4.

4). $P(Z \leq -1.5)$



From tables

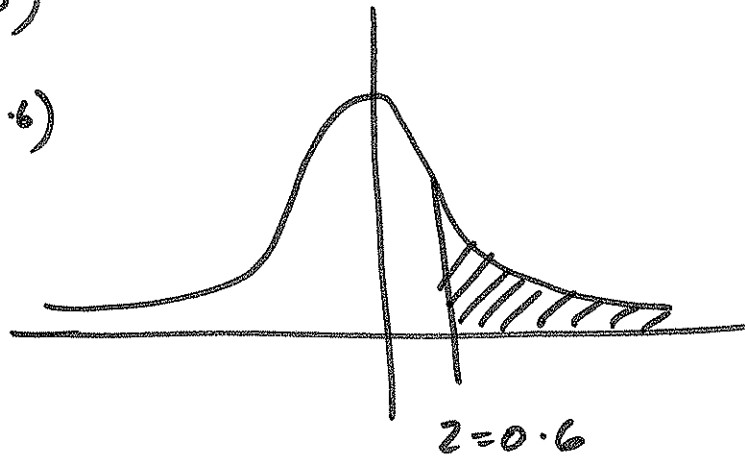
$P(Z \leq -1.5) = 0.0668.$

6) $P(Z \geq 0.6)$

$$= 1 - P(Z \leq 0.6)$$

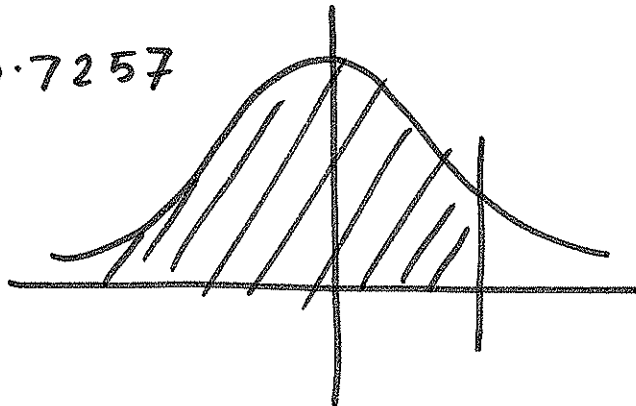
$$= 1 - 0.7257$$

$$= 0.2743$$



From table

$$P(Z \leq 0.6) = 0.7257$$

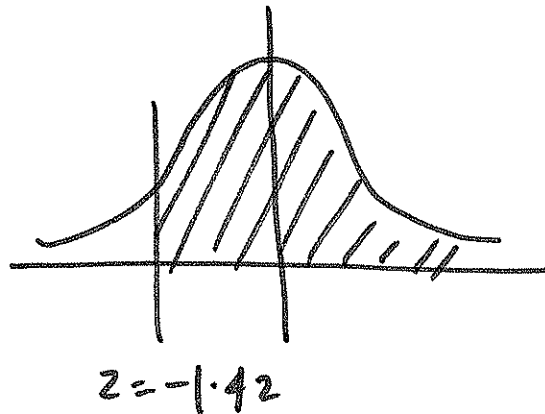


8) $P(Z \geq -1.42)$

$$= 1 - P(Z \leq -1.42)$$

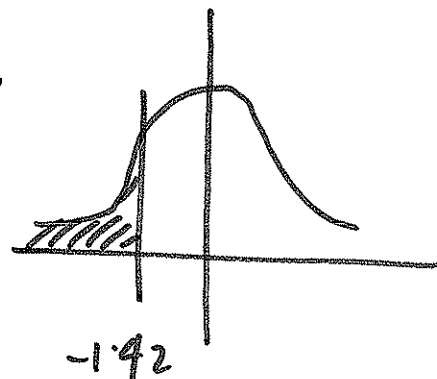
$$= 1 - 0.0778$$

$$= 0.9222$$



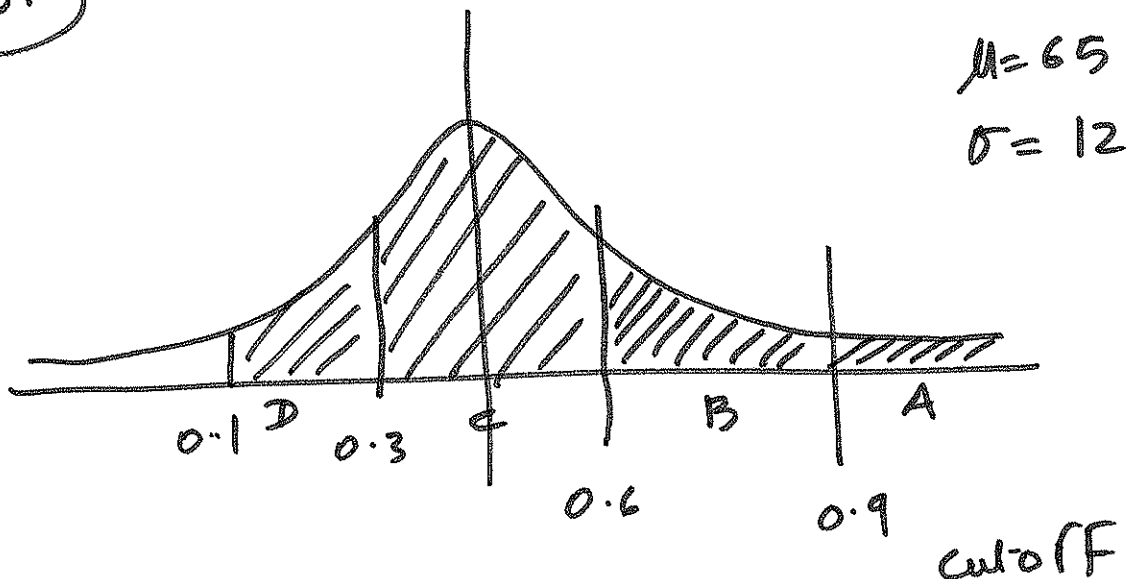
From Tables

$$P(Z \leq -1.42) = 0.0778$$



Q 5.

7



A $\text{inv norm}(0.9, 65, 12) = 80.38$

B $\text{inv norm}(0.6, 65, 12) = 68.04$

C $\text{inv norm}(0.3, 65, 12) = 58.71$

D $\text{inv norm}(0.1, 65, 12) = 49.62$

6) F1

$$F = P(1 + rt)$$

$$= 2000(1 + 0.06(\frac{3}{12}))$$

$$F = 2030$$

$$\therefore \text{Int} = F - P = 30\$$$

4) $F = 5000(1 + 0.07 \cdot 3)$
 $= 6050$

$$\text{Int} = 6050 - 5000$$

$$= 1050$$

$$6) P = 5000$$

$$r = 0.05$$

$$t = 4/12$$

$$F = 5000(1 + 0.05 \cdot 4)$$

$$F = 5083.33.$$

$$10) F = 5200 \quad t = 4/12$$

$$P = 5000$$

$$5200 = 5000(1 + r \cdot \frac{4}{12})$$

$$\frac{5200}{5000} = (1 + \frac{4}{12}r)$$

$$1.04 = 1 + \frac{4}{12}r$$

$$r = 12\%.$$

$$12) P = 8000 \quad F = 9200 \quad t = 3$$

$$9200 = 8000(1 + r \cdot 3)$$

$$1.15 = 1 + 3r$$

$$r = 5\%.$$

$$16) P = 8000 \quad r = 0.07 \quad t = 3$$

$$8000 = P(1 + 0.07(3)) = P \cdot (1.21)$$

$$P = \frac{8000}{1.21} = 6611.57.$$

F.2

①

2) $P = 2000$

$$F = P(1+i)^n$$

$$r = 0.09$$

$$m = 1 \quad n = m \cdot t = 1.$$

$$F = 2000(1+0.09)^1$$

$$t = 1$$

$$F = 2180$$

$$\ddot{i} = r/m = 0.09$$

4) $m = 1$

$$a) \quad F = P \left(1 + \frac{r}{m}\right)^{mt} = 1000 \left(1 + \frac{0.1}{1}\right)^1 = 1100$$

$$c) \quad m = 12 \quad F = 1000 \left(1 + \frac{0.1}{12}\right)^{12} = 1104.871$$

$$b) \quad m = 4 \quad F = 1000 \left(1 + \frac{0.1}{4}\right)^{4(1)} = \$1103.81$$

$$d) \quad m = 52 \quad F = 1000 \left(1 + \frac{0.1}{52}\right)^{52(1)} = 1105.06$$

$$e) \quad m = 365 \quad F = 1000 \left(1 + \frac{0.1}{365}\right)^{365} = 1105.16.$$

$$12) \quad r_{\text{eff}} = \left(1 + \frac{r}{m}\right)^m - 1$$

$$a) \quad m = 2 \quad r_{\text{eff}} = \left(1 + \frac{0.1}{2}\right)^2 - 1 = 0.1025 = 10.25\%$$

$$b) \quad m = 4 \quad r_{\text{eff}} = \left(1 + \frac{0.1}{4}\right)^4 - 1 = 0.1038 = 10.38\%$$

$$16. F = 100,000$$

$$a) r = 0.10$$

$$t = 40$$

$$F = P(1+r)^n$$

$$100,000 = P\left(1 + \frac{0.1}{1}\right)^{40}$$

$$P = 2209.49$$

$$20) F = \$2,000,000 \quad t = 50 \quad r = 0.06 \quad m = 1$$

$$2,000,000 = P(1 + 0.06)^{50}$$

$$P = \$608,576.62$$

$$30) t = 1994 - 1803 = 191 \quad r = 0.06 \quad m = 1$$

$$P = 0.04$$

$$F = 0.04(1 + 0.06)^{191} = \$2725.71$$

$$32) \text{ Bank 1}$$

$$r_{\text{eff}} = \left(1 + \frac{0.065}{4}\right)^4 - 1$$

$$\approx 0.066$$

$$\approx 6.66\%$$

$$\text{Bank 2}$$

$$r_{\text{eff}} = \left(1 + \frac{0.06}{365}\right)^{365} - 1$$

$$= 0.0682$$

$$= 6.82\%$$

(11)

F3

$$6) = R = 100$$

$$r = 0.12$$

$$M = 52$$

$$t = 52 \times 40$$

$$F = \frac{(1+i)^n - 1}{i} \cdot R$$

$$= \frac{\left(1 + \frac{0.12}{52}\right)^{52 \cdot 40} - 1}{\frac{0.12}{52}} \cdot 100$$

$$= \$ 5,193,080.77$$

~~227~~

Math 1070 Q Review Soln Midterm 3.

①

Q10) a) $r = 0.06$
 $n = 1 \times 3 = 3$
 $m = 1$
 $i = \frac{r}{m} = 0.06$

b) $r = 0.06$
 $n = 4 \times 12 + 6 = 54$
 $i = r/m = \frac{0.06}{12} = 0.005$

c) $r = 0.09$
 $m = 4$
 $n = 4 \times 3 + 3 = 12 + 3 = 15$
 $i = 0.09/4 = 0.0225$

11) $r = 0.06$ $n = 5 \times 4 = 20$
 $m = 4$ $R = 800$
 $i = \frac{0.06}{4}$

$$P = \frac{(1+i)^n - 1}{i} \cdot R$$

$$= \frac{(1 + \frac{0.06}{4})^{20} - 1}{(\frac{0.06}{4})} \cdot 800 = 18498.93\$$$

b) $800 \times 20 = 16000$ So Total int 18498.93
 $- 16000.00$
 $\hline 2498.93\$$

(2)

(12)

Case 1

Megan gets 1000 puts it in bank

$$r = 0.06$$

$$m = 1$$

$$t = 9$$

$$n = 1 \times 9 = 9$$

$$\begin{aligned} F &= P(1+i)^n \\ &= 1000(1 + \frac{0.06}{1})^9 \\ &= \underline{1689.47} \end{aligned}$$

Case 2 → She gets 1700 £ @ the end of 9 years

Clearly case 2 is better.

(13)

House cost 90,000

Down payment 10,000

$$\text{Loan Amt} = (90,000 - 10,000) = 80,000$$

$$r = 0.09$$

$$m = 12$$

$$t = 25$$

$$n = 25 \times 12 = 300$$

$$i = \frac{r}{m} = \frac{0.09}{12}$$

$$P = \frac{(1+i)^n - 1}{i(1+i)^n} \cdot R$$

$$80000 = \frac{\left(1 + \frac{0.09}{12}\right)^{300} - 1}{\left(\frac{0.09}{12}\right)\left(1 + \frac{0.09}{12}\right)^{300}} \cdot R$$

$$R = 671.36$$

b). 300 x monthly payments

$$300 \times 671.36 = 201407.1273$$

He also had made a down payment of 10,000

$$\therefore \text{Total cost of the house} = 201407.13$$

$$+ 10,000.00$$

$$\hline 211,407.13$$

c) Total interest = (Payments made - loan Amt)

$$= (201407.13 - 80,000)$$

$$= 121407.13 \$$$

d) Unpaid balance after 23 years.

X. Always ask the question how many pay periods are remaining in the amortization schedule

In this case 24.

④

$$\therefore n = 24.$$

$$P_{23} = \frac{\left(1 + \frac{0.09}{12}\right)^{24} - 1}{\left(\frac{0.09}{12}\right) \left(1 + \frac{0.09}{12}\right)^{24}} \cdot 671.36$$
$$= 14695.497$$

e). similar to above

$$P_{24} = \frac{\left(1 + \frac{0.09}{12}\right)^{12} - 1}{\left(\frac{0.09}{12}\right) \left(1 + \frac{0.09}{12}\right)^{12}} \cdot 671.36$$
$$= 7676.94.$$

So total principle paid in 24th year

$$P_{23} - P_{24} = 7019.03 \$$$

Each year you make the same amount of payment

$$12 \times R = 12 \times 671.36 = 8056.32 \$$$

$$\therefore \text{Total int in year 24} = \begin{array}{r} 8056.32 \\ - 7019.03 \\ \hline = 1037.29 \$ \end{array}$$