ANSWERS

1. COMPLEX NUMBER

EXERCISE 1.1

Q.1 i) 0 ii) $11i$

Q.2 i) $(3-i)$ ii) $(3+i)$

iii) $-\sqrt{5}+\sqrt{7}\,i$ iv) $\sqrt{5}\,i$

v) $-5i$ vi) $(\sqrt{5}+i)$

vii) $(\sqrt{2}-\sqrt{3}\,i)$ viii) $\cos\theta - i\sin\theta$

Q.3 i) $a = 3,\ b = \frac{1}{2}$ ii) $a = 5,\ b = 0$

iii) $a = -3,\ b = 7$ iv) $a = \pm 2,\ b = \pm 6$

v) $a = \frac{3}{13},\ b = \frac{2}{13}$

vi) $a = \frac{3}{2},\ b = \frac{-1}{2}$

Q.4 i) $a = -4, b = -3$ ii) $a = 0, b = 1$

iii) $a = \frac{-7}{2},\ b = \frac{1}{2}$ iv) $a = \frac{3}{10},\ b = \frac{-1}{10}$

v) $a = -1, b = 0$ vi) $a = \frac{-8}{29},\ b = 0$

vi) $a = \frac{-1}{4},\ b = \frac{-1}{4}$

viii) $a = \frac{11}{19},\ b = \frac{2\sqrt{3}}{19}$

ix) $a = \frac{23}{13},\ b = \frac{15}{13}$

Q.6 $4 + 6i$

Q.7 i) $-i$ ii) 1

iii) i iv) 1

v) $-i$ vi) -1

vii) 1 viii) 0

Q.9 i) $2i$ ii) 0

Q.10 -1

Q.11 1

Q.13 Yes, its value $= -2 \in R$

Q.14 $2i$

Q.16 0

Q. 24 i) $x = 1, y = 2$ ii) $x = -2, y = 2$

iii) $x = 1, y = 2$ iv) $x + y = 3$

v) $x + y = 9$

EXERCISE 1.2

Q.1 i) $\pm(1-3i)$ ii) $\pm(4+3i)$

iii) $\pm(2-\sqrt{3}\,i)$ iv) $\pm(\sqrt{5}+\sqrt{2}\,i)$

v) $\pm(\sqrt{3}-i)$ ii) $\pm(\sqrt{5}+\sqrt{2}\,i)$

Q.2 i) $\frac{-1+\sqrt{7i}}{8}, \frac{-1-\sqrt{7i}}{8}$

ii) $\frac{\sqrt{3}+\sqrt{5i}}{4}, \frac{\sqrt{3}-\sqrt{5i}}{4}$

iii) $\frac{7+\sqrt{11}i}{6}, \frac{7-\sqrt{11}i}{6}$ iv) $2+3i$, $2-3i$

Q.3 i) $-5i$, $2i$ ii) $\frac{i}{2}$, $-2i$

iii) $-2i$ iv) $-2i$

Q.4 i) $-1+2i$, $3-i$ ii) $3\sqrt{2}$, $2i$

iii) $2+3i$, $3-4i$ iv) $1-i, \frac{4}{5}\ \frac{-2i}{5}$

Q. 5 i) 7 ii) 2

iii) 7 iv) 200 - 264i

v) 6

EXERCISE 1.3

Q.1 i) $\sqrt{74}$, $-\tan^{-1}\left(\frac{5}{7}\right)$

ii) i , $\tan^{-1}\left(\frac{\sqrt{2}}{\sqrt{3}}\right)$

iii) 17, $-\tan^{-1}\left(\frac{15}{8}\right)$ iv) $3\sqrt{2}$, $\frac{3\pi}{4}$

v) $4\sqrt{2}$, $\frac{\pi}{4}$ vi) $\frac{11\pi}{6}$

vii) 3,0 viii) $\sqrt{2}$, $\frac{\pi}{4}$

ix) 2, $\frac{\pi}{3}$ x) $5\sqrt{2}$, $\tan^{-1}7$

Q.2 $\theta = n\pi$, $n \in Z$

Q.4 i) $2\left(\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}\right)$; $2e^{\frac{2\pi}{3}i}$

ii) $1\left(\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2}\right)$; $e^{\frac{3\pi}{2}i}$

iii) $1(\cos\pi + i\sin\pi)$; $e^{\pi i}$

iv) $\frac{1}{\sqrt{2}}\left(\cos\frac{7\pi}{4}+i\sin\frac{7\pi}{4}\right)$; $\frac{1}{\sqrt{2}}e^{\frac{7\pi}{4}i}$

v) $\frac{1}{\sqrt{2}}\left(\cos\frac{3\pi}{4}+i\sin\frac{3\pi}{4}\right)$; $\frac{1}{\sqrt{2}}e^{\frac{3\pi}{4}i}$

vi) $\sqrt{2}\left(\cos\frac{3\pi}{4}+i\sin\frac{3\pi}{4}\right)$; $\sqrt{2}e^{\frac{3\pi}{4}i}$

Q.5 i) $\frac{3}{2}+\frac{\sqrt{3}i}{2}$ ii) $(1-i)$

iii) $\frac{-7\sqrt{3}}{2}-\frac{7i}{2}$ iv) $\frac{1+\sqrt{3}i}{2}$

v) $\frac{-1+i\sqrt{3}}{2}$ vi) $\frac{-\sqrt{3}+i}{2}$

Q. 6 $\frac{1}{\sqrt{2}}$, $\frac{3\pi}{4}$

Q. 7 $\sqrt{2}(\cos\theta + i\sin\theta)$ where

$\tan\theta = \frac{\sqrt{3}+1}{\sqrt{3}-1}$

EXERCISE 1.4

Q.1 i) 1 ii) 1

iii) 1 iv) 1

Q.3 i) -1 ii) 0

iii) -1 iv) 0

v) 1

Q.6 i) $x^2 + y^2 = 100$ ii) $(x-3)^2 + y^2 = 4$

iii) $(x-5)^2 + (y+6)^2 = 25$

iv) $x + 2 = 0$ v) $y = -x$

vi) $2y - 3 = 0$

Q.7 i) $\cos 2\theta + i\sin 2\theta$ ii) $\cos 11\theta + i\sin 11\theta$

iii) 1

Q.8 i) $-4+4i$ ii) $-8i$

iii) $-8+8\sqrt{3}\,i$ iv) $512\sqrt{3}+512i$

MISECLLANEOUS EXERCISE - 1

(I)

Q. No.	1	2	3	4	5
Ans	B	D	A	C	B

Q. No.	7	8	9	10
Ans	B	A	D	D

(II) 1)

i) $(3+8i)$ ii) $-4+0i$

iii) $(14-5i)$ iv) $\frac{15}{2}-10i$

v) $-30+10i$ vi) $\frac{1}{2}+\frac{7}{2}i$

vii) $\frac{-35}{26}-\frac{45}{26}i$ viii) $\frac{1}{4}+\frac{\sqrt{15}}{4}i$

ix) $-i$ x) $\frac{40}{25}+\frac{56}{25}i$

2) i) $x=2,\ y=1$ ii) $x=17, y=19$

iii) $x=\frac{28}{61}, y=\frac{3}{61}$ iv) $x=4, y=-2$

3) i) $-i$ ii) 0

4) i) 1 ii) 0

5) i) $\pm(3+5i)$ ii) $\pm(4-i)$

iii) $\pm(\sqrt{3}+i)$ iv) $\pm(3+3i)$

v) $\pm(2-i)$ vi) $\pm\sqrt{2}\ (2+i)$

6) i) $17,\ \tan^{-1}\left(\frac{15}{8}\right)$,

$17(\cos\theta+i\sin\theta)$ where $\tan\theta=\frac{15}{8}$

ii) $\sqrt{37},\ \theta=\tan^{-1}\left(\frac{-1}{6}\right)$,

$\sqrt{37}(\cos\theta+i\sin\theta)$ where $\tan\theta=\frac{-1}{6}$

iii) $1,\ \frac{\pi}{3},\ 1\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)$

iv) $1,\ 5\frac{\pi}{4},\ 1\left(\cos 5\frac{\pi}{4}+i\sin\left(5\frac{\pi}{4}\right)\right)$

v) $2,\ \frac{\pi}{2},\ 2\left(\cos\frac{\pi}{2}+i\sin\frac{\pi}{2}\right)$

vi) $3,\ \frac{3\pi}{2},\ 3\left(\cos\frac{3\pi}{2}+i\sin\frac{3\pi}{2}\right)$

vii) $1,\ \frac{\pi}{4},\ 1\left(\cos\frac{\pi}{4}+i\sin\frac{\pi}{4}\right)$

9) $x=1,\ y=2$

12) i) $2\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right);\ 2e^{\frac{\pi}{3}i}$

ii) $\sqrt{38}(\cos\theta+i\sin\theta)$ where $\tan\theta=\frac{-\sqrt{2}}{6}$;

$\sqrt{38}\,e^{i\theta}$

iii) $3(\cos\theta+i\sin\theta)$ where $\tan\theta=-\sqrt{3}$;

$3e^{i\theta}$

16) i) $-i$ ii) 0 iii) -1

17) $\frac{1}{4}+\frac{9}{4}i$

20) 2

2. SEQUENCES AND SERIES

EXERCISE 2.1

1) i), ii) and iii) are G.Ps iv) and v) not G.Ps.

i) $2(3)^{n-1}$ ii) $(-5)^{n-1}$ iii) $\sqrt{5}\left(\frac{1}{5}\right)^{n-1}$

2) i) $t_7 = \frac{1}{81}$ ii) $t_6 = 7$ iii) $a = -7$ iv) $r = 3$

3) $t_{10} = 5^{10}$ 4) $x = \pm\frac{4}{9}$ 5) $t_1 = \frac{4}{25}, r = \frac{5}{2}$

6) 3, 6, 12 or 12, 6, 3

7) $\frac{1}{27}, \frac{1}{3}, 3, 27$ or $27, 3, \frac{1}{3}, \frac{1}{27}$

8) 1, 2, 4, 8, 16 or 1, –2, 4, –8, 16

11) 800 12) $80\left(\frac{3}{4}\right)^6$ ft, $80\left(\frac{3}{4}\right)^n$ ft

13) i) 6, –3 ii) $3(2)^{19}$; –3 iii) $3(2)^{n-1}$; $3(-1)^{n-1}$

14) i) $200(1.1)^3$ ii) $200(1.1)^{10}$ iii) $200(1.1)^n$

15) i) 10 ii) 4 iii) $4(5)^{n-1}$

EXERCISE 2.2

1) i) $3\left(2^n - 1\right)$ ii) $\frac{p^2}{p-q}\left[1-\left(\frac{q}{p}\right)^n\right]$ if $q < p$

and $\frac{p^2}{q-p}\left[\left(\frac{q}{p}\right)^n - 1\right]$ if $q > p$

iii) $\frac{7}{9}\left[1-\frac{1}{10^n}\right]$ iv) $\frac{-\sqrt{5}}{\left(\sqrt{5}+1\right)}\left[\left(-\sqrt{5}\right)^n - 1\right]$

2) i) $\frac{266}{243}$ ii) 3 3) i) 5 ii) $\frac{3}{5}$

4) i) 635 ii) 2046

5) i) $\frac{3}{81}\left[10\left(10^n - 1\right) - 9n\right]$

ii) $\frac{8}{81}\left[10\left(10^n - 1\right) - 9n\right]$

6) i) $\frac{4}{81}\left[9n - \left(1 - \frac{1}{10^n}\right)\right]$

ii) $\frac{7}{81}\left[9n - \left(1 - \frac{1}{10^n}\right)\right]$

7) i) $\frac{5}{9}\left[1-\left(\frac{1}{10}\right)^n\right]$ ii) $\frac{2}{9}\left[1-\left(\frac{1}{10}\right)^n\right]$

8) $t_n = 4(3)^{n-1}$

11) i) 6138 ` ii) $\frac{15}{2}\left[3^{10} - 1\right]$

12) 20.1 Lac 15) 10 years

EXERCISE 2.3

1) i) 1 ii) 6

iii) $-\frac{9}{4}$ iv) does not exist v) 90

2) i) $\frac{7}{9}$ ii) $\frac{22}{9}$ iii) $\frac{106}{45}$ iv) $\frac{2296}{45}$

3) 4 4) $-\frac{11}{6}$ 5) $\frac{15}{4}, \frac{15}{16}, \frac{15}{64}\ldots$

6) i) 4 ii) $-\frac{1}{4}$ iii) $\frac{8}{3}$ iv) $\frac{2}{3}$

7) i) 2 ii) $\frac{4\sqrt{2}}{\sqrt{2}-1}$ 8) 25 m

EXERCISE 2.4

1) (i) and (iii) are H.P. ; (ii) is not H.P.

2) i) $\frac{1}{3n-1};\frac{1}{23}$ ii) $\frac{1}{2n+2};\frac{1}{18}$

iii) $\frac{1}{5n};\frac{1}{40}$

3) 5 4) $\frac{24}{5}$ 5) 60 6) $\frac{3}{11},\frac{3}{10}$

7) –3, 9 8) 4, 16 9) 4, 9

EXERCISE 2.5

1) i) $\frac{2\left(1-nx^n\right)}{1-x}+\frac{2x\left(1-x^{n-1}\right)}{\left(1-x\right)^2}$

ii) $\frac{1-\left(3n-2\right)x^n}{1-x}+\frac{3x\left(1-x^{n-1}\right)}{\left(1-x\right)^2}$

iii) $\frac{n\left(3^n\right)-1}{2}+\frac{3-3^n}{4}$ iv) $3\left[\left(n-1\right)2^n+1\right]$

2) i) $\frac{16}{9}$ ii) $\frac{75}{16}$ iii) $\frac{3}{16}$

EXERCISE 2.6

1) $\frac{n\left(4n^2+9n-1\right)}{6}$ 2) $\frac{n}{2}(2n^2+2n+1)$

3) $\frac{n\left(n+3\right)}{4}$ 4) $\frac{n\left(n+1\right)\left(n+2\right)}{12}$

5) $\frac{n}{3}\left(16n^2+48n+41\right)$

6) $\frac{2n\left(n+1\right)(2n+1)}{3}$ 7) 2485

8) $n^2(n+1)^2+\frac{8.n(n+1)(2n+1)}{6}+\frac{3.n(n+1)}{2}$

9) 48

MISCELLANEOUS EXERCISE - 2

(I)

1	2	3	4	5	6	7	8	9	10
D	C	A	C	A	C	C	A	D	C

II)

1) 3072 2) $\frac{211}{81}$ 3) $\frac{3}{4}$

4) $a=\frac{49}{5}$; $r=\frac{5}{7}$ 5) 5,10,20 or 20,10,5

6) $\frac{1}{3}$, 1, 3, 9, 27 or 27, 9, 3, 1, $\frac{1}{3}$

8) $\frac{2}{81}\left[10\left(10^n-1\right)-9n\right]$

9) $\frac{2}{3}\left(1-\frac{1}{10^n}\right)$ 10) $\frac{n}{6}\left(10n^2+27n-1\right)$

11) $\frac{n\left(n+1\right)\left(3n^2-17n+26\right)}{12}$

12) $\frac{n\left(n+1\right)\left(n+2\right)}{18}$ 13) $\frac{n\left(n+1\right)\left(2n+1\right)}{24}$

14) $6\left[\frac{n\left(n+1\right)\left(2n+1\right)}{6}+\frac{n(n+1)}{2}\right]$

15) $2n(n+1)(n+3)(n+4)$

16) $\frac{n\left(4n^2+15n+17\right)}{36}$

17) 2364 18) 9 19) 1275

20) 5 21) $\frac{7}{15}$ 22) $\frac{1}{3}$ 23) $2\left[1-\left(\frac{2}{3}\right)^n\right]$

24) 2 25) $2187\left[1-\left(\frac{2}{3}\right)^8\right]$ 26) 1

27) 10, 20 (28) A.P. 32) $\frac{4}{45}$ 33) $\frac{35}{16}$

3. PERMUTIONS AND COMBINATIONS

EXERCISE 3.1

1) 50 ways

2) 12

3) i) 25 ii) 20

4) i) 100 ii) 48

5) 125

6) 124

7) 31

8) 90

9) 225

10) 24

11) 276

12) 207

13) 12

14) 216

EXERCISE 3.2

1) i) 40320 ii) 3628800
iii) 3628080 iv) 24

2) i) 665280 ii) 2
iii) 720 iv) 12
v) 84 vi) 29
vii) 57.93 viii) 20160

3) i) $\frac{10!}{4!}$ ii) $3^5 \times 5!$
iii) $\frac{9!}{5!}$ iv) $5^4 \times 4!$

4) i) 28 ii) 1
iii) 3003 iv) 6435

5) i) 1848 ii) 43/14
iii) 5 iv) 6
v) 8

6) i) 11 ii) 11
iii) 7 iv) 8
v) 5

10) i) $(2n + 1)(2n + 2)$ ii) $\frac{n+3}{n-2}$
iii) $\frac{-(n+1)}{n(n-2)!}$ iv) $(3n +2)n!$
v) $\frac{n^2+1}{(n+1)!}$ vi) $\frac{(n^2+1)}{(n+1)!}$
vii) 0 viii) $\frac{1}{(n+2)!}$

EXERCISE 3.3

1) n = 9

2) m = 6, n = 2

3) r = 6

5) a) 2401 b) 840

6) a) 30240 b) 151200
c) 43200 d) 5040

7) $\frac{12! \times 13!}{7}$

8) a) 1440 b) 720
c) 7! d) 240
e) 120 f) 120

9) 144

10) a) 1296 b) 360

11) 100

12) 720 a) 120, b) 600

13) 46800, 20800

14) 243

15) i) 2880 ii) 5040

16) i) 120 ii) 48 iii) 72

17) i) 720 ii) 144 iii) 288 iv) 144

EXERCISE 3.4

1) i) 120 ii) 60480
iii) 30240 iv) 5040
v) 302400

2) 1260

3) a) 70 b) 37

4) $\frac{13!}{5!4!4!}$

5) $\frac{12!}{2!3!2!}$

6) $\frac{11!}{4!2!2!}$ a) 405720 b) $\frac{8!}{2!2!}$

7) 210 8) 60

9) $\frac{10!}{2!3!2!}$ 10) 1260, 1230

11) 180 12) 144

13) 36, 84 14) 180, 60

15) a) 1800 b) 72

EXERCISE 3.5

1) 7! = 5040 2) 20!, 2·18!

3) a) 2·23! b) 21·22!

4) $\frac{14!}{2}$

5) 2·8!

6) a) 5! × 2! = 240 b) 2400

7) 7! × $8P_6$ 8) 144

9) $\frac{9!}{4!}$ 10) 12·13!

EXERCISE 3.6

1) a) 1365 b) 3160 c) $^{16}C_5$ d) $^{19}C_{15}$

2) a) n = 2 b) n = 7
c) n = 9

3) r = 4

4) a) n = 10, r = 3 b) n = 10, r = 4

5) r = 8 6) 126

7) 39200 8) 120

9) 12 10) 190

11) $^{n}C_2$ – n; a) 35 b) 90 c) 54 d) 20

12) 190

13) a) 45 b) 40

14) a) 220 b) 216

15) 151200

16) i) n = 20 ii) n = 4, 3
iii) n = 1, 2 iv) n = r
v) n = 6

17) x = r! 18) r = 7

19) 14161

20) a) 2508 b) 1646 c) 5973

21) 16 22) 2275

23) 36873 ; 6885 24) 425

25) 51051

26) a) 84 b) 126

MISCELLANEOUS EXERCISE - 3

(I)

1	2	3	4	5	6	7	8	9	10
C	A	B	D	C	B	D	B	C	D

(II)

1) 45 2) 120

3) 720 ; AINMRE 4) 990

5) 360 6) 5541965

7) 15 8) $\frac{30!}{7!\ 10!\ 13!}$

9) 127 10) ${}^9C_3 + {}^9C_4 + {}^9C_5$

11) 4095 12) 48

13) 1680 14) 63

15) $\frac{20!}{8!\ 7!\ 5!}$ 16) 896

17) 60

18) i) 66 ii) 11 iii) 220 iv) 55

4. METHOD OF INDUCTION AND BINOMIAL THEOREM

EXERCISE 4.1

Hints :

2) $p(n) = 3 + 7 + 11 + \ldots + (4n - 1) = n(2n + 1)$

5) $p(n) = 1^3 + 3^3 + 5^3 + \ldots + (2n - 1)^3 = n^2(2n^2 - 1)$

7) $p(n) = 1.3 + 3.5 + 5.7 + \ldots + (2n - 1)(2n + 1)$

$= \frac{n}{3}(4n^2 + 6n - 1)$

9) $p(n) = \frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \ldots + \frac{1}{(2n+1)(2n+3)}$

$= \frac{n}{3(2n+3)}$

EXERCISE 4.2

1) i) $49 + 20\sqrt{6}$ ii) $145\sqrt{5} - 229\sqrt{2}$

2) i) $16x^8 + 96x^6 + 216x^4 + 216x^2 + 81$

ii) $64x^6 - 192x^4 + 240x^2 - 160 + \frac{60}{x^2} - \frac{12}{x^4} + \frac{1}{x^6}$

3) i) $32\sqrt{3}$ ii) 1364

5) i) 108243216 ii) 1.61051

6) i) 970.299 ii) 0.6561

7) i) 16 ii) 16

8) 1.1262

9) 1.051

10) 0.5314

EXERCISE 4.3

1) i) $4032x^{10}$ ii) $84480x^2$

iii) $\frac{10500}{x^3}$ iv) $\frac{55a^{16}}{9}$

v) $\frac{{}^{13}C_9 \cdot 3^4 \cdot 4^9}{a^5}$

2) i) $122472\sqrt{2}$ ii) 700000

iii) 48620 iv) $\frac{5}{16}$

v) $\frac{-105}{8192}$

3) i) $\frac{1792}{9}$ ii) -96096

iii) 405 iv) 84

v) 10500000

4) i) 924 ii) $35x^5$, $35x^2$

iii) $1120x^4$ iv) -252

v) $-462x^9$ and $462x^2$

5) $k = 5$

6) 91854

7) m = 8

EXERCISE 4.4

1) i) $1-4x+10x^2-20x^3+\ldots$

ii) $1-\frac{x}{3}-\frac{x^2}{9}-\frac{5x^3}{81}-\ldots$

iii) $1+3x^2+6x^4+10x^6+\ldots$

iv) $1-\frac{x}{5}+\frac{3x^2}{25}-\frac{11x^3}{125}+\ldots$

v) $1-x^2+x^4-x^6+\ldots$

2) i) $a^{-3}\left[1+\frac{3b}{a}+\frac{6b^2}{a^2}+\frac{10b^3}{a^3}+\ldots\right]$

ii) $a^{-4}\left[1-\frac{4b}{a}+\frac{10b^2}{a^2}-\frac{20b^3}{a^3}+\ldots\right]$

iii) $a^{\frac{1}{4}}\left[1+\frac{b}{4a}-\frac{3b^2}{32a^2}+\frac{7b^3}{128a^3}+\ldots\right]$

iv) $a^{-\frac{1}{4}}\left[1+\frac{b}{4a}+\frac{5b^2}{32a^2}+\frac{15b^3}{128a^3}+\ldots\right]$

v) $a^{-\frac{1}{3}}\left[1-\frac{b}{3a}+\frac{2b^2}{9a^2}-\frac{14b^3}{81a^3}+\ldots\right]$

3) i) $1-8x+40x^2+\ldots$

ii) $1-\frac{3x}{2}+\frac{27x^2}{8}+\ldots$

iii) $2^{\frac{1}{3}}\left(1-\frac{x}{2}-\frac{x^2}{4}\ldots\right)$

iv) $5^{-\frac{1}{2}}\left(1-\frac{2x}{5}+\frac{6x^2}{25}+\ldots\right)$

v) $5^{-\frac{1}{3}}\left(1+\frac{x}{5}+\frac{2x^2}{25}+\ldots\right)$

4) i) 9.9499 ii) 5.0133

iii) 2.0025 iv) 0.9057

v) 1.0625

MISCELLANEOUS EXERCISE - 4

(I)

1	2	3	4	5	6	7	8	9	10
B	C	C	A	A	D	D	D	B	D

(II)

4) $243x^{10} + 810x^8y + 1080x^6y^2 + 720x^4y^3 + 240x^2y^4 + 32y^5$

5) $\frac{16x^4}{81}-\frac{16x^2}{9}+6-\frac{9}{x^2}+\frac{81}{16x^4}$

6) $\frac{27}{2}x^4y^6$ 7) $\frac{1760}{x^3}$

8) i) -20 ii) $\frac{-63x^5}{8y^5}$

iii) $280x^8y^6$ and $560x^6y^8$

iv) $\frac{189}{16}x^6$ and $-\frac{21}{8}x^3$

9) i) 378 ii) 153

10) i) 2268 ii) 7920

12) ± 2 13) 2

14) $\frac{9}{7}$ 15) 2

18) $1+\frac{x}{3}+\frac{x^2}{6}+\frac{5x^3}{54}+\ldots$

19) $1+\frac{x}{4}+\frac{5x^2}{32}+\frac{15x^3}{128}+\ldots$

20) $5^{-\frac{1}{2}}\left[1-\frac{2x}{5}+\frac{6x^2}{25}-...\right]$

21) 9.9833

22) 0.2451

23) –80

24) a = 3, b = –2, c = 57

25) $n = 9$

26) $n = 6$; $k = -2$

5. SETS AND RELATIONS

EXERCISE 5.1

1) i) A = {M, O, V, E, N, T}

ii) B {–1, 0, 1, 2, 3, 4}

iii) C = {3, 5, 7, ...}

2) i) $\{x \mid x \in W, x \notin N\}$

ii) $\{x \mid -3 \le x \le 3, x \in Z\}$

iii) $\{x \mid x = \frac{n}{n^2+1}, n \in N \text{ and } n \le 7\}$

iv) $\{x \mid x = (-1)^{n-1} \times (n-1), n \in N\}$

3) $A \cup B \cup C = \{\frac{-5}{3}, -1, \frac{-1}{2}, \frac{3}{2}, 3\}$

4) $A \cap B \cap C = \{\ \}$

6) i) 45 ii) 10 iii) 10 iv) 25

7) i) 132 ii) 63

8) i) 1750 ii) 250 iii) 1100

9) 42

10) i) 114 ii) 38 iii) 188

11) $P(A) = \{\phi, \{1\}, \{2\}, \{3\}, \{1,2\}, \{2,3\}, \{1,3\}, \{1,2,3\}\}$

12) i) $\{x \mid x \in R, -3<x<0\}$

ii) $\{x \mid x \in R, 6 \le x \le 12\}$

iii) $\{x \mid x \in R, x>6\}$

iv) $\{x \mid x \in R, x<5\}$

iv) $\{x \mid x \in R, 2<x \le 5\}$

iv) $\{x \mid x \in R, -3 \le x<4\}$

13) 9

14) i) (–8, 6] ii) $(-\infty, -4) \cup (5, \infty)$

iii) $(-\infty, 4) \cup \left[\frac{20}{3}, \infty\right)$ iv) $\left[\frac{1}{3}, \frac{1}{2}\right]$

15) i) (–7, 6] ii) [2, 9]

iii) (–7, 3] ∪ [4, 9] iv) [2, 3]

v) [4, 6] vi) { }

vii) (3, 6] viii) $(-\infty, 2) \cup (9, \infty)$

ix) [2, 4) iv) (–7, 2)

EXERCISE 5.2

1) $x = 2$, $y = -2$

2) $x = \frac{1}{6}, y = \frac{15}{2}$

3) $A \times B = \{(a,x), (b,x), (c,x), (a,y), (b,y), (c,y)\}$

$B \times A = \{(x,a), (x,b), (x,c), (y,a), (y,b), (y,c)\}$

$A \times A = \{(a,a), (a,b), (a,c), (b,a), (b,b), (b,c), (c,a) (c,b), (c,c)\}$

$B \times B = \{(x,x), (x,y), (y,x), (y,y)\}$

4) $P \times Q = \{(1,1), (1,4), (2,1), (2,4), (3,1), (3,4)\}$

$Q \times P = \{(1,1), (1,2), (1,3), (4,1), (4,2), (4,3)\}$

6) {(0,10), (6,8), (8,6), (10,0)}

8) i) R_1 = {(2,4), (3,9), (5,25), (7,49), (11,121), (13,169)}

Domain R_1 = {2,3,5,7,11,13}

Range R_1 = {4,9,25,49,121,169}

ii) $R_2 = \{(1,1), (2,\frac{1}{2}), (3,\frac{1}{3}), (4,\frac{1}{4}), (5,\frac{1}{5})\}$

Domain R_2 = {1,2,3,4,5}

Range $R_2 = \{1,\frac{1}{2},\frac{1}{3},\frac{1}{4},\frac{1}{5}\}$

iii) R_3 = {(1,3), (2,6), (3,9)}

Domain R_3 = {1,2,3}

Range R_3 = {3,6,9}

iv) R_4 = {(1,4), (1,6), (2,4), (2,6)}

Domain R_4 = {1,2}

Range R_4 = {4,6}

v) R_5 = {(0,3), (1,2), (2,1), (3,0)}

Domain R_5 = {0,1,2,3}

Range R_5 = {3,2,1,0}

vi) R_6 = {(1,4), (2,4), (3,4), (4,4), (5,4)}

Domain R_6 = {1,2,3,4,5}

Range R_6 = {4}

vii) R_7 = {(1,5), (2,4), (3,3), (4,2), (5,1)}

Domain R_7 = {1,2,3,4,5}

Range R_7 = {5,4,3,2,1}

viii) R_8 = {(1,3), (2,4), (3,5), (4,6)}

Domain R_8 = {1,2,3,4}

Range R_8 = {3,4,5,6}

MISCELLANEOUS EXERCISE - 5

I)

1	2	3	4	5	6	7	8	9	10
C	D	D	C	A	D	C	D	D	D

II)

1) i) $A = \{x / x = 10n, n \in N, n \leq 5\}$

ii) $B = \{x / x$ is the vowel of English alphabet$\}$

iii) $C = \{x / x$ is a day of a week$\}$

2) i) {1,2,4,6,7,9,11} ii) { }

iii) {1,10} iv) {2,4,6,7,11}

v) {1,2,3,4,5,6,7,8,9,10,11,12}

vi) {4,7}

3) 230 4) 12

5) i) $A \times A = \{(1,1),(1,2),(1,3),(2,1),(2,2),(2,3),(3,1),(3,2),(3,3)\}$

$A \times B$ = {(1,2),(1,4),(2,2),(2,4),(3,2),(3,4)}

$B \times A$ = {(2,1),(2,2),(2,3),(4,1),(4,2),(4,4)}

$B \times B$ = {(2,2),(2,4),(4,2),(4,4)}

$(A \times B) \cap (B \times A)$ = {(2,2)}

ii) $A \times A \times A = \{(-1,-1,-1),(-1,-1,1),(-1,1,-1,(-1,1,1),(1,-1,-1),(1,-1,1),(1,1,-1),(1,1,1)\}$

6) i) Yes; D = {1}, R = {4,5,6}

ii) Yes; D = {1,2,3}, R = {4,5,6}

iii) Yes; D = {1,2,3}, R = {4,5,6}

iv) No.

7. i) D = {1,2,3,4}, R = {4}

ii) D = {-2,-1,0,1,2}, R = {0,1,2,3}

8. i) { } ii) A×A

9) reflexive, not symmetric and not transitive.

10) Yes

6. FUNCTION

EXERCISE 6.1

1) a) Yes b) No
c) No

2) a) No b) Yes
c) No d) Yes

3) a) Yes b) No
c) Yes d) Yes
e) No

4) a) 1 b)19 c) $-\frac{1}{4}$ d) $x^2 - x - 1$
e) $x^2 + 3x + 1$ f) $h + 1$

5) a) $\frac{6}{5}$ b) ± 3 c) $\frac{1}{2}, -\frac{2}{3}$ d) 1,–2,3

6) a) $0, \pm 3$ b) $\frac{17 \pm \sqrt{33}}{2}$

7) 1) a = –2, b = 2

8) a) $R; \left[-\frac{11}{7}, \infty\right)$ b) $R - \{2\}$; $R - \{1\}$
c) $(-5, \infty)$; R^+ d) R; R e) $[2,5]$; $[0, \frac{3}{2}]$
f) [3,7) ; [0,∞] g) [–4,4] ; [0,4]

9) a) $A = s^2$ b) $A = \frac{p^2}{16}$

10) a) $A = \pi r^2$ b) $A = \frac{\pi d^2}{4}$ c) $A = \frac{c^2}{4\pi}$

11) $x(30 - 2x)^2$; (0,15)

12) Not a function; f (0) has 2 values.

13) a) Injective but not surjective
b) neither injective nor surjective
c) neither injective nor surjective
d) injective but not surjective
e) injective and surjective

16) $\frac{3}{16}$

17) a) $5 = \log_2 32$ b) $0 = \log_{54} 1$
c) $1 = \log_{23} 23$ d) $\frac{3}{2} = \log_9 27$
e) $-4 = \log_3 \left(\frac{1}{81}\right)$ f) $-2 = \log_{10} 0.01$
g) $ln\ 7.3890 = 2$ h) $ln\ 1.6487 = \frac{1}{2}$
i) $ln\ 6 = -x$

18) a) $2^6 = 64$ b) $\frac{1}{25} = 5^{-2}$ c) $0.001 = 10^{-3}$
d) $8 = \left(\frac{1}{2}\right)^{-3}$ e) $e^0 = 1$ f) $e^1 = e$ g) $\frac{1}{2} = e^{-0.693}$

19) a) $(5,\infty)$ b) $(-\infty,2) \cup (3,\infty)$

20) a) $\log p + \log q - \log r - \log s$
b) $\frac{1}{2} \log x + \frac{1}{3} \log y$
c) $3\ ln\ a + 2\ ln\ (a-2) - \frac{1}{2}\ ln\ (b^2 + 5)$
d) $2\left[\frac{1}{3}ln(x-2) + 4ln(2x+1) - ln(x+4) - \frac{1}{2}ln(2x+4)\right]$

21) a) $\log\left(\frac{x^5 y^7}{z}\right)$ b) $\log\left(\sqrt[3]{x-1}\sqrt{x}\right)$
c) $ln\left[\frac{x^2-4}{(x+5)^3}\right]$

22) $\frac{5a+b}{2}$ 24) $a = \frac{15}{4}$, $b = 9$

25) a) 3 b) 11, c) 8 d) 1

EXERCISE 6.2

1) a) $9x+4$ b) 0 c)238

d) $\frac{3x+5}{6x-1}$; $R - \left\{\frac{1}{6}\right\}$

2) {(2,4), (4,2), (5,4)}

3) a) $50x^2 - 40x + 11$ b) $10x^2 + 13$

c) $8x^4 + 24x^2 + 21$

d) $25x - 12$

5) a) f^{-1} does not exist

b) f^{-1} doesn not exist

c) $f^{-1}(x) = \frac{3x+7}{6}$

d) f^{-1} does not exist

e) $f^{-1} = \sqrt[3]{\frac{x-8}{9}}$

f) f^{-1} does not exist

6) a) 22 b) 7 c) 3

7) a) –18 b) –14 c) 5 d) 25

8) a) 10 b) –5

9) a) 25 b) –3 c) –15 d) 21

10) a) –5 b) 1.75 c) –4.4. d) –30

11) a) $(-\infty,-9], [1,\infty)$ b) 1·5, 4·5

c) { } d) [–3,3]

f) 3 + r ; 0≤r<1 g) { }

h) N, Z i) $n + 0.5$, $n \in Z$

j) $x = 0$

MISCELLANEOUS EXERCISE - 6

(I)

1	2	3	4	5	6	7	8	9	10
B	B	B	C	C	A	A	B	C	B

(II)

1) i) Function ; {2,4,6,8,10,12,14}; {1,2,3,4,5,6,7}

ii) Not a function

iii) Function ; {2,3,5}; {1,2}

2) i) not one one ii) one one

3) i) not onto ii) not onto

4) $f^{-1}(x) = \left(\frac{x+8}{5}\right)^{\frac{1}{3}}$

5) $f^{-1}(x) = \frac{5(x-2)}{3}$

6) 1,–3, does not exist

7) i) 2 ii) 0

8) $3x^4 - 12x^3 + 13x^2 - 2x + 5$

9) a = 4, $f(4) = 16$

10) a = 3, b = –2

11) i) $g \circ f = \{(1,6),(2,8),(3,10),(4,12)\}$

ii) $g \circ f = \{(1,1),(2,64),(3,64),(4,27)\}$

12) i) $f \circ g = x^2 - 16x + 69$, $gof = x^2 - 3$

ii) $f \circ g = 3x^2 - 2$, $gog = 9x^2 - 12x + 4$

iii) $f \circ g = 256x^2$, $gof = 16x^2$

15) $f \neq g$

19) 8 22) log4

23) $\log_{10}5$

26) $\frac{3}{2}$, $\frac{1}{2}$ 33) 2

34) 3 37) –8

39) a) $(-3,0) \cup (2,5)$ b) {–2,2,4}

c) $[-3,-2] \cup [2,3]$ d) (–2,8)

e) $[\frac{13}{5},7)$ f) $[\frac{9}{2},5)$

g) $x = 0$ h) $x = 6k$, $k \in Z$

40) a) $R-\{2,-3\}$

b) $[3,4) \cup (4,5)$

c) $[-1,1]$ d) W

e) $\{1,2,3\}$ f) $[0,1]$

g) $(-\infty, 3-\sqrt{3}) \cup (3+\sqrt{3}, \infty)$

41) a) $[0,\infty)$ b) $[-\frac{1}{6}, \frac{1}{6}]$

c) $(0,1]$ d) $(-1,0]$

e) $(1,\infty)$

42) a) $fog(x) = x = gof(x)$

b) $fog(x) = x = gof(x)$

43) a) $f(x) = 2x - 3$ or $-2x + 2$

b) $f(x) = x^2 + 2$

44) a) $\frac{x}{\sqrt{1+2x^2}}$ b) x

7. LIMITS

EXERCISE 7.1

I) 1) $-\frac{1}{\sqrt{3}}$ 2) 15 3) $-\frac{1}{25}$

II) 1) $\frac{2\sqrt{3}}{3}$ 2) $-\frac{3}{16}$ 3) $\frac{3}{125}$ 4) $\pm\frac{2}{\sqrt{3}}$

III) 1) $\frac{n(n+1)}{2}$ 2) $\frac{2}{3\sqrt[3]{7}}$ 3) 4 4) 4

5) $-\frac{1}{6}$ 6) 24 7) $\frac{3\sqrt{a+2}}{2}$

8) $294\sqrt{7}$ 9) n^2

EXERCISE 7.2

I) 1) $-\frac{1}{4}$ 2) $-\frac{1}{2}$ 3) $-\frac{1}{2}$ 4) $-\frac{1}{2}$ 5) 8

II) 1) $\frac{4}{3}$ 2) 0 3) 0 4) $2x-2$ 5) -3

6) Does not exist

III) 1) 3 2) -2 3) $\frac{1}{2}$ 4) 0 5) $-\frac{3}{a^2}$

EXERCISE 7.3

I) 1) $\frac{1}{2\sqrt{6}}$ 2) $-\frac{1}{18}$ 3) -1 4) $\sqrt{2}$

II) 1) $\frac{2}{3\sqrt{3}}$ 2) -8 3) $\frac{1}{8\sqrt{3}}$ 4) $\frac{1}{2a}$ 5) $-\frac{2}{3}$

III) 1) $\frac{7}{2}$ 2) 1 3) 24 4) $-\frac{1}{3}$ 5) $\frac{1}{18}$

EXERCISE 7.4

I) 1) $\frac{m}{n}$ 2) 2 3) 2 4) $\frac{1}{2}$

II) 1) $\frac{n^2}{m^2}$ 2) $-\frac{1}{4}$ 3) $\frac{1}{\sqrt{2}}$

III) 1) $\frac{a^2-b^2}{c^2}$ 2) $-\frac{1}{4\sqrt{2}}$ 3) $2\sqrt{2}$ 4) -3

EXERCISE 7.5

I) 1) $\frac{1}{2}$ 2) $5a^{\frac{4}{5}}.\cos a$ 3) $\frac{1}{8}$

4) $\frac{1}{3}$ 5) $\frac{2}{\pi}$

II) 1) $-\frac{1}{2\sqrt{3}}$ 2) $\frac{1}{16\sqrt{2}}$ 3) $\frac{1}{36}$

4) $\frac{\cos\sqrt{a}}{2\sqrt{a}}$ 5) $-\frac{1}{2}$

EXERCISE 7.6

I) 1) $\frac{\log\left(\frac{9}{5}\right)}{\log 4}$ 2) $\log\frac{15}{2}$ 3) $\log(abc)$

4) $\log\left(\frac{40}{9}\right)$ 5) $\log 2$.

II) 1) $(\log 3)^2$ 2) $e^{\frac{2}{3}}$ 3) $e^{14/3}$ 4) $-\frac{2}{3}$

5) e^8 6) $e^{\frac{2}{3}}$

III) 1) $\frac{1}{2}\log\frac{a}{b}$ 2) $\frac{(\log 2)^3}{\log 3}$ 3) $\log 3.\log 5$

4) $(\log 5)^2$ 5) $\frac{1}{2}\left[\log\left(\frac{7}{5}\right)\right]^2$

EXERCISE 7.8

I) 1) $\frac{a}{e}$ 2) 1 3) $\frac{7}{8}$

II) 1) 7 2) 2 3) 2

III) 1) 15 2) $\frac{256}{81}$ 3) $\frac{1}{2}$ 4) $\left(\frac{3}{2}\right)^{30}$ 5) 4

MISCELLANEOUS EXERCISE - 7

I)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	B	A	D	C	C	C	C	A	D	B	D	C	B	B

II)

1) $\frac{5}{3}$ 2) Does not exist 3) $2\pi r$

4) Does not exist 5) 3 6) 21 7) $\frac{1}{2}$ 8) 1

9) $\frac{-1}{10}\log 2$ 10) $2(\log a)^2$ 11) $\cos a$ (12) $\frac{1}{2}$

13) $\frac{ab}{2}\log\frac{b}{a}$ 14) $\frac{(\log 5)^2}{\log 2}$

15) $\frac{(2)^2(7)^3}{(5)^5}=\frac{1372}{3125}$ 16) $a\sin a+\cos a$

17) $2\sqrt{2}$ 18) $(\log 2)^2$ 19) $(\log 2)^2$ 20) $\frac{1}{2}$

21) Does not exist 22) $\frac{n(n+1)(4n-1)}{6}$

23) $\frac{1}{256}$ 24) 2

8. CONTINUITY

EXERCISE 8.1

1) (i) Continuous at $x = -2$ (ii) Continuous at $x = \frac{\pi}{4}$ (iii) Discontinuous at $x = 3$

2) (i) Discontinuous. (ii) Continuous.
(iii) Continuous

3) Discontinuous at $x = -2$, $x = -1$, $x = 0$, $x = 1$.

4) Continuous.

5) (i) Discontinuous. (ii) Continuous.
(iii) Continuous (iv) Continuous
(v) Discontinuous at $x = 2$

6) (i) Removable (ii) Jump
(iii) Jump (iv) Removable

7) (i) Extension = 0 i.e. $f(0) = 0$
(ii) Extension = 7/2, i.e. $f(0) = \frac{7}{2}$
(iii) Extension = –2/3, i.e. $f(-1) = -\frac{2}{3}$

8) (i) Discontinuous (ii) Discontinuous
(iii) Continuous

9) (i) Removable, $f(0) = 3/2$
(ii) Removable, $f(0) = 5/3$
(iii) Removable, $f(0) = e^{-2}$
(iv) Irremovable
(v) Irremovable

10) (i) $-\frac{1}{4\sqrt{3}}$ (ii) $-\frac{4}{3}$ (iii) $4(\log 2)^2$

11) (i) $\frac{3}{2}$ (ii) $(\log 5)^2$ (iii) $a = -18/5,\ b = 7.$
(iv) $a = 2,\ b = -4.$
(v) $a = 1/2$ and $b = 1/2$

12) Continuous

13) Continuous
[*Clue* : $(\sin x + \cos x)^3 = [(\sin x + \cos x)^2]^{3/2}$
$= (1 + \sin 2x)^{3/2}$, *Let* $(1 + \sin 2x) = t$]

14) $p = -3$ and $q = 4$

MISCELLANEOUS EXERCISE - 8

(I)

1	2	3	4	5	6	7	8	9	10
A	D	D	B	A	B	A	B	C	C

(II) (1) Continuous on its domain except at $x = 5$
(2) Continuous on its domain except at $x = 5$
(3) Discontinuous at $x = 0$
(4) Continuous at $x = 1$
(5) Discontinuous
(6) Discontinuous at $x = -1, 0, 1$.
(7) Continuous on R, except at $x = 5$.

(III) (1) Removable.
(2) Jump
(3) Continuous.

(IV) (1) Removable

$$f(x) = \frac{(x+3)(x^2-6x+8)}{x^2-x-12}$$
$$= -5 \quad \text{for } x = -3$$
$$= 2 \quad \text{for } x = 4$$

(2) Irremovable

(V) (1) e^6 (2) 125

(VI) (1) $a = 2 \quad b = 4$

(2) $a = -\frac{4}{5},\ b = \frac{27}{5}$

(VII) (1) $f(1) = \frac{\pi}{2}$ (2) $f(\pi) = \frac{49}{10}$

(VIII) (1) $f(1) < 0$ and $f(2) > 0$

(2) $f(z) = 0$; $f(3) < 0$ and $f(4) > 0$

9. DIFFERENTIATION

EXERCISE 9.1

1) (a) $2x + 3$ b) $3\cos(3x)$ c) $2e^{2x+1}$ d) $3^x \log 3$
e) $\frac{2}{2x+5}$ f) $2\sec^2(2x + 3)$
g) $5\sec(5x - 2)\tan(5x - 2)$ h) $\frac{3\sqrt{x}}{2}$

2) a) $\frac{1}{3}$ b) 2 c) $384 \log 2$ d) $\frac{2}{5}$
e) $3e^2$ f) $\frac{1}{\sqrt{2}}$

5) i) Continuous and differentiable
ii) Continuous and differentiable

6) Neither continuous nor differentiable at $x = 2$

7) Continuous but not differentiable

8) Continuous but not differentiable

9) Continuous and differentiable

EXERCISE 9.2

(I) (1) $\frac{4}{3}x^{\frac{1}{3}} + e^x - \cos x$

(2) $\frac{1}{2\sqrt{x}} + \sec^2 x - 3x^2$

(3) $\frac{1}{x} + \operatorname{cosec} x.\cot x + 5^x \log 5 + \frac{9}{2x^{\frac{5}{2}}}$

(4) $\frac{7}{3}x^{\frac{4}{3}} + \frac{4}{x^{\frac{1}{5}}} + \frac{2}{x^{\frac{7}{5}}}$

(5) $7^x \log 7 + 7x^6 - \sqrt{x} - \frac{1}{x}$

(6) $-3\operatorname{cosec}^2 x - 5e^x + \frac{3}{x} + \frac{3}{x^{\frac{7}{4}}}$

(II) (1) $x^4(x\sec^2 x + 5\tan x)$

(2) $x^2(1+3\log x)$

(3) $(x^2+2)[(x^2+2)\cos x + 4x\sin x]$

(4) $e^x\left(\frac{1}{x} + \log x\right)$

(5) $\sqrt{x}e^x[1 + x\log x + \frac{3}{2}\log x]$

(6) $3x^2(1+3\log x)$

(III)

(1) $\frac{5}{2}x^{\frac{3}{2}} + x^3(1+4\log x)$

(2) $e^x \sec x(\tan x + 1) - x^{\frac{2}{3}}(1 + \frac{5}{3}\log x)$

(3) $4x^3 - x^{\frac{3}{2}}\sin x + \frac{3}{2}\sqrt{x}\cos x - xe^x(x+2)$

(4) $(x^3-2)\sec^2 x + 3x^2\tan x + x\sin x - \cos.x + x^6.7^x(7 + x\log 7)$

(5) $\frac{\sin x}{x} + \cos x\log x + e^x(-\sin x + \cos x) - e^x\left(\frac{1+2x}{2\sqrt{x}}\right)$

(6) $e^x(\sec^2 x + \tan x) + \frac{\cos x}{x} - \sin x\log x - 5^x\left(\frac{2x\log 5 + 1}{2\sqrt{x}}\right)$

(IV) (1) $-\frac{16x}{(x^2-5)^2}$

(2) $-\frac{5}{\sqrt{x}\left(\sqrt{x}-5\right)^2}$

(3) $\frac{e^x(x^2+e^x)}{(x+e^x)^2}$

(4) $\frac{x+(\log x)^2}{(x+\log x)^2}$

(5) $\frac{x^2(1+\sin x + x\cos x) + x\sin 2x}{(x+\cos x)^2}$

(6) $\frac{2e^x}{(3e^x-2)^2}$

(V) (1) $f(x) = 5x^2 - 18x + 3$

(2) $f(x) = (\sqrt{3}+1)\sin x + (\sqrt{3}-1)\cos x$

MISCELLANEOUS EXERCISE - 9

I. (1) C (2) D (3) C (4) B

(5) B (6) D (7) A (8) C

II. (1) Differentiable

(2) p = -3 , q = 5

(3) p = 1/3 , q = -4/3

(4) $p = \pi/2$, $q = (2-\pi)/2$

(5) Not Differentiable

(6) Not Differentiable

(7) Not Differentiable.

(8) Differentiable

(9) 2. Hint : Add and subtract 2f(2) in numerator.

(10) $\frac{e}{2}$

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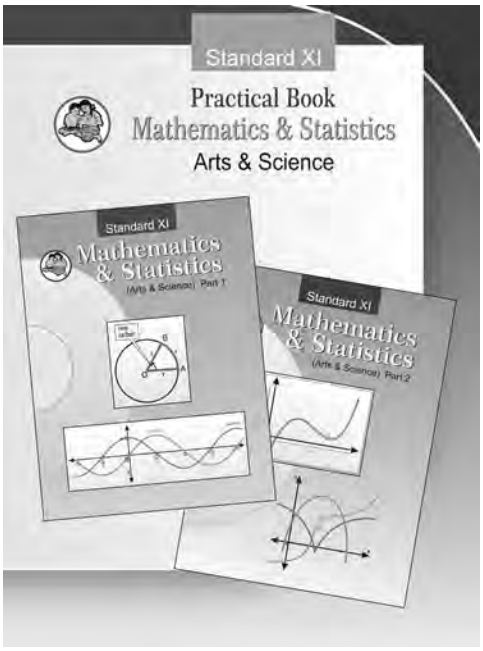

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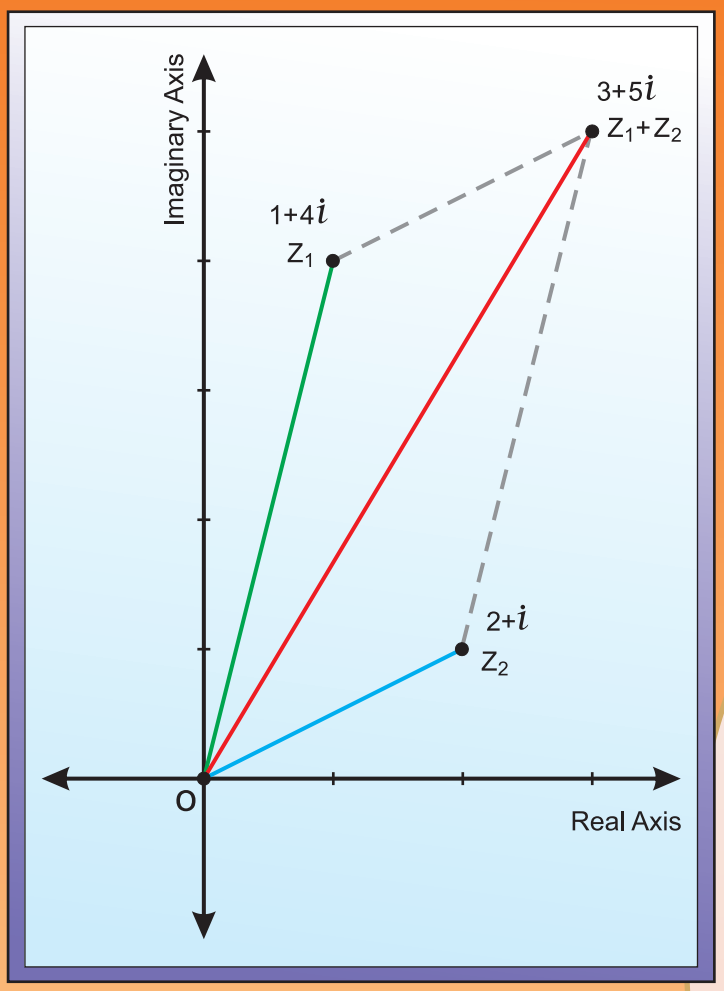

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