Anastasya
4C1

Chpt. 14 (Binomial Theorem) Date No.

6. $(1+p)^6 = 1 + {}^6C_1 \times 1 \times p + {}^6C_2 \times 1 \times p^2 + {}^6C_3 \times 1 \times p^3 + \dots$

$= 1 + 6p + 15p^2 + 20p^3 + \dots$ #

$(1+x+x^2)^6 = 1 + 6(x+x^2) + 15(x+x^2)^2 + \dots$

$= 1 + 6x + 6x^2 + 15(x^2 + 2x^3 + x^4) + \dots$

$= 1 + 6x + 6x^2 + 15x^2 + \dots$

$= 1 + 6x + 21x^2 + \dots$ #

$1.0101 = 1 + 0.0101$

$= 1 + 0.01 + (0.01)^2$

$\therefore (1.0101)^6 = 1 + 6(0.01) + 21(0.01)^2$

$= 1.0621$

$= 1.062$ #

10. $(1+ax)^6 = 1 + {}^6C_1(ax) + {}^6C_2(ax)^2 + \dots$

$= 1 + 6ax + 15a^2x^2 + \dots$ #

$(1+bx)(1+ax)^6 = (1+bx)(1+6ax+15a^2x^2+\dots)$

$= 1 + 6ax + 15a^2x^2 + bx + 6abx^2 + 15a^2bx^3 + \dots$

$= 1 + (6a+b)x + (15a^2+6ab)x^2 + 15a^2bx^3 + \dots$

$\therefore 6a + b = 0$

$b = -6a$ ——(1)

$15a^2 + 6ab = -\frac{21}{4}$ —(2)

Sub (1) into (2):

$15a^2 + 6a(-6a) = -\frac{21}{4}$

$15a^2 - 36a^2 = -\frac{21}{4}$

$-21a^2 = -\frac{21}{4}$

$-84a^2 = -21$

$4a^2 = 1$

$a^2 = \frac{1}{4}$

$a = \frac{1}{2}$ or $-\frac{1}{2}$

Date No.

When $a=\frac{1}{2}$,

$b=-6\times\frac{1}{2}$

$=-3$

When $a=-\frac{1}{2}$

$b=-6\times-\frac{1}{2}$

$=3$

$\therefore$ When $a=\frac{1}{2}$, $b=-3$ #. or

When $a=-\frac{1}{2}$, $b=3$ #.

12.(i) $\left(1+\frac{3x}{2}\right)^5 = 1+{}^5C_1\left(\frac{3x}{2}\right)^1+{}^5C_2\left(\frac{3x}{2}\right)^2+\ldots$

$= 1+\frac{15x}{2}+\frac{45x^2}{2}+\ldots$ #.

(ii) $(2-x)^5 = 2^5+{}^5C_1(2)^4(-x)+{}^5C_2(2)^3(-x)^2+\ldots$

$= 32-80x+80x^2+\ldots$

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

$= \left(1+\frac{15x}{2}+\frac{45x^2}{2}+\ldots\right)\left(32-80x+80x^2+\ldots\right)$

$= \ldots+80x^2-600x^2+720x^2+\ldots$

$= \ldots+200x^2+\ldots$

$\therefore$ The coeff. of x^2 is 200 #.

22. a. $T_{(8+1)} = {}^{11}C_8(3)^3\times(x)^8$

$= 4455x^8$

$T_{(9+1)} = {}^{11}C_9\times3^2\times x^9$

$= 495x^9$

$(1+2x)(3+x)^{11} = (1+2x)(\ldots+4455x^8+495x^9+\ldots)$

$= \ldots+495x^9+8910x^9+\ldots$

$= \ldots+9405x^9+\ldots$

$\therefore$ The coefficient of x^9 term is 9405 #.

Date No.

b. $T_{(r+1)} = {}^{7}C_r \times (x^2)^{7-r} \times \left(-\frac{2}{x}\right)^r$

$= {}^{7}C_r \times x^{14-2r} \times (-2)^r \times (x^{-r})$

$= {}^{7}C_r \times (-2)^r \times x^{14-3r}$

$\Rightarrow 14 - 3r = 5$

$-3r = -9$

$r = 3$

$\therefore$ Coeff of $x^5 = {}^{7}C_3 \times (-2)^3$

$= -280$ #.

c. $(a+b)^n = a^n + {}^{n}C_1 \times a^{n-1} \times b + {}^{n}C_2 \times a^{n-2} \times b^2 + \ldots$

$\frac{q^2}{pr} = \frac{(n \times a^{n-1} \times b)^2}{a^n \times {}^{n}C_2 \times a^{n-2} \times b^2}$

$= \frac{(n \times a^{n-1} \times b)(n \times a^{n-1} \times b)}{a^{n+n-2} \times b^2 \times \frac{n!}{(n-2)!\,2!}}$

$= \frac{(n \times a^{n-1} \times b)(n \times a^{n-1} \times b)}{a^{n-1} \times a^{n-1} \times b \times b \times \frac{n(n-1)}{2}}$

$= \frac{n \times a^{n-1} \times b}{a^{n-1} \times b \times \frac{n-1}{2}}$

$= \frac{n}{1} \times \frac{2}{n-1}$

$= \frac{2n}{n-1}$ # (shown)

$\frac{32^2}{4 \times 96} = \frac{2n}{n-1}$

$\frac{1024}{384} = \frac{2n}{n-1}$

$3n = 4n - 4$

$n = 4$ #.

Date No.

29.a.(i) $T_{(2+1)} = {}^{13}C_2 \times (-ax)^2$

$= 78a^2x^2$

$78a^2 = 702$

$a^2 = 9$

$\therefore a = 3$ #.

(ii) $T_{(3+1)} = {}^{13}C_3 \times (-3x)^3$

$= -7722x^3$

$\therefore$ Coeff. of x^3 is -7722 #.

b. $T_{(r+1)} = {}^8C_r (x)^{8-r} \left(\frac{1}{2x}\right)^r$

$= {}^8C_r \times x^{8-r} \times \left(\frac{1}{2}\right)^r \times x^{-r}$

$= {}^8C_r \times \left(\frac{1}{2}\right)^r \times x^{8-2r}$

$\Rightarrow 8 - 2r = 0$

$-2r = -8$

$r = 4$

When $r = 4$,

Coeff of ~~x~~ the term $= {}^8C_4 \times \left(\frac{1}{2}\right)^4$

$= 4.375$ #.