pg. 293-295 #1(odd), 2-5, 8, 9(odd), 11(odd), 12

1a) $_{17}C_{11} = {}_{16}C_{10} + {}_{16}C_{11}$

c) $_{n+1}C_{r+1} = {}_{n}C_{r} + {}_{n}C_{r+1}$

e) $_{15}C_{10} + {}_{15}C_{9} = {}_{16}C_{10}$

g) $_{18}C_{9} - {}_{17}C_{9} = {}_{17}C_{8}$

i) $_{n}C_{r} - {}_{n-1}C_{r-1} = {}_{n-1}C_{r}$

2a) 4
b) 2
c) 5

3a) 13
b) 6
c) 21

4a) $\binom{n}{r} = \binom{11}{9} = 55$ b) $\binom{n}{r}\binom{11}{0} = 1$ c) $\binom{n}{r}\binom{11}{5} = 462$

5a) $2^9 = 512$ b) 0 c) $2^{15} = 32768$ d) 2^n

8) 9

9a) $(a+b)^n = \sum_{r=0}^{n} \binom{n}{r} a^{n-r} b^r + \dots$

$= (x+y)^7 = \sum_{r=0}^{7} = \binom{7}{0}x^7 + \binom{7}{1}x^6y^1 + \binom{7}{2}x^5y^2 + \binom{7}{3}x^4y^3 + \binom{7}{4}x^3y^4 + \binom{7}{5}x^2y^5$
$+ \binom{7}{6}x^1y^6 + \binom{7}{7}y^7$

$= x^7 + 7x^6y + 21x^5y^2 + 35x^4y^3 + 21x^2y^5 + 7xy^6 + y^7$

c) $(2x-5y)^5 = \sum_{0}^{5} = \binom{5}{0}(2x)^5 + \binom{5}{1}(2x)^4(-5y)^1 + \binom{5}{2}(2x)^3(-5y)^2 + \binom{5}{3}(2x)^2(-5y)^3 +$
$\binom{5}{4}(2x)(-5y)^4 + \binom{5}{5}(-5y)^5$

$= 32x^5 + 5(16x^4)(-5y) + 10(8x^3)(25y^2) + 10(4x^2)(-125y^3) + 5(2x)(625y^4) - 125y$
$= 32x^5 - 400x^4y + 2000x^3y^2 - 5000x^2y^3 + 6250xy^5 - 3125y^5$

e) $(3a^2+4c)^7$
$= \binom{7}{0}(3a^2)^7 + \binom{7}{1}(3a^2)^6(4c)^1 + \binom{7}{2}(3a^2)^5(4c)^2 + \binom{7}{3}(3a^2)^4(4c)^3 + \binom{7}{4}(3a^2)^3(4c)^4 + \binom{7}{5}(3a^2)^2(4c)^5$
$+ \binom{7}{6}(3a^2)(4c)^6 + \binom{7}{7}(4c)^7$

$= (3a^2)^7 + 7(729a^{12})(4c) + 21(243a^{10})(16c^2) + 35(81a^8)(64c^3) + 35(27a^6)(256c^4) + 21(9a^4)(1024c^5)$
$+ 7(3a^2)(4096c^6) + 16384c^7$

$= 2187a^{14} + 20412a^{12}c + 81648a^{10}c^2 + 181440a^8c^3 + 241920a^6c^4 + 193536a^4c^5 +$
$86016a^2c^6 + 16384c^7$

11a) $(x^2 - x^{-1})^5$

b) $\left(x^{\frac{1}{2}} + 2x^2\right)^6$

c) $\left(y^{\frac{1}{2}} - 2y^{-\frac{1}{2}}\right)^7$

12a) $x^6 + 6x^5y + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + y^6$
$= (x+y)^6$

b) $y^{12} + 8y^9 + 24y^6 + 32y^3 + 16$

$(a+b)^4$

First term $\binom{n}{0} a^n$ last term $\binom{n}{n} b^n$

$\binom{4}{0} a^n = y^{12}$
$a^n = y^{12}$
$a^4 = y^{12}$
$a^4 = (y^3)^4$
$a = y^3$

$\binom{4}{4} b^n = 16$
$b^n = 16$
$b^4 = 16$
$2^4 = 16$
$b = 2$

$(y^3+2)^4$

c) $(a+b)^5$ last $-b^5$

1st $\binom{5}{0} a^5 = 243a^5$
$a^5 = 243a^5$
1st term $a = (3a)^5$

$(3a-b)^5$