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1.a. $n = 14$
$r = 4$

$$nC_r = \frac{n!}{(n-r)!\,r!}$$

$$14C_4 = \frac{14!}{(14-4)!\,4!}$$

$$= \frac{14!}{10!\,4!}$$

$$= \frac{14 \times 13 \times 12 \times 11 \times \cancel{10!}}{\cancel{10!} \times 4 \times 3 \times 2 \times 1}$$

$$= \frac{24.024}{24}$$

$$= 1.001 //$$

b. $n = 6$
$r = 4$

$$nC_r = \frac{n!}{(n-r)!\,r!}$$

$$6C_4 = \frac{6!}{2! \times 4!}$$

$$= \frac{6 \times 5 \times \cancel{4!}}{2! \times \cancel{4!}}$$

$$= \frac{30}{2} = 15 //$$

No.

Date

c. $n = 8$
$r = 4$

$$nC_r = \frac{n!}{(n-r)!\,r!}$$

$$8C_4 = \frac{8!}{(8-4)!\,4!}$$

$$= \frac{8 \times 7 \times 6 \times 5 \times \cancel{4!}}{\cancel{4!} \times 4!}$$

$$= \frac{1.680}{24}$$

$$= 70 //$$

d. $6C_4 + 8C_4 = 15 + 70 = 85 //$

e. $n1 = 6$
$n2 = 8$
$r = 2$

$$n_1C_r = \frac{n!}{(n-r)!\,r!}$$

$$6C_2 = \frac{6!}{(6-2)!\,2!}$$

$$= \frac{6 \times 5 \times \cancel{4!}}{\cancel{4!} \times 2!}$$

$$= \frac{30}{2} = 15$$

$$n_2C_r = \frac{n!}{(n-r)!\,r!}$$

$$8C_2 = \frac{8!}{(8-2)!\,2!}$$

$$= \frac{8 \times 7 \times \cancel{6!}}{\cancel{6!} \times 2!}$$

$$= \frac{56}{2} = 28$$

$= 15 \times 28$

$= 420 //$

2. $n_1 = 52 \quad r = 7$

$n_2 = 45$

$n_3 = 38$

$n_4 = 31$

$$n_1 C r = \frac{n!}{(n-r)!\,r!}$$

$$= \frac{52!}{(52-7)!\,7!}$$

$$= \frac{52 \times 51 \times 50 \times 49 \times 48 \times 47 \times 46 \times \cancel{45!}}{\cancel{45!} \times 7!}$$

$$= 133.784.560 //$$

$$n_2 C r = \frac{n!}{(n-r)!\,r!}$$

$$= \frac{45!}{(45-7)!\,7!}$$

$$= \frac{45 \times 44 \times 43 \times 42 \times 41 \times 40 \times 39 \times \cancel{38!}}{\cancel{38!} \times 7!}$$

$$= 45.379.620 //$$

$$n_3 C r = \frac{n!}{(n-r)!\,r!}$$

$$= \frac{38!}{(38-7)!\,7!}$$

$$= \frac{38 \times 37 \times 36 \times 35 \times 34 \times 33 \times 32 \times \cancel{31!}}{31! \times 7!}$$

$$= 12.620.256 //$$

No.

Date

$$n4Cr = \frac{n!}{(n-r)!r!}$$

$$= \frac{31!}{(31-7)!7!}$$

$$= \frac{31 \times 30 \times 29 \times 28 \times 27 \times 26 \times 25 \times \cancel{24!}}{\cancel{24!}\ 7!}$$

$$= 2.629.575 //$$

$$n1Cr + n2Cr + n3Cr + n4Cr = 194.414.011 //$$

3. $n = 4 \times 6 = 24$
$r = 6$

$$nCr = \frac{n!}{(n-r)!r!}$$

$$= \frac{24!}{(24-6)!6!}$$

$$= \frac{24 \times 23 \times 22 \times 21 \times 20 \times 19 \times \cancel{18!}}{\cancel{18!} \times 6!}$$

$$= 134.596 //$$

4. $n = 5$
$r = 2$

$$nCr = \frac{n!}{(n-r)!r!}$$

$$= \frac{5!}{(5-2)!2!}$$

$$= \frac{5 \times 4 \times \cancel{3!}}{\cancel{3!} \times 2!}$$

$$= 10 //$$