M118
FALL 2009

QUIZ 2

NAME _____

1) 6 horses are in a horse race. For the purposes of this problem, they are called A,B,C,D,E,F.

a) (10 PTS.) In how many ways can they finish first, second, and third?

Example: One way is to have them finish EAB (i.e E wins, A is second, B is third).

$6 \cdot 5 \cdot 4 = 120$

Your answer here: Number of ways = 120

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b) (10 PTS.) In how many ways can they finish first, second, and third if B finishes second?

Example: One way is to have them finish is EBA (i.e E wins, B is second, A is third).

5 B 4 $\quad 5 \cdot 4 = 20$

1st 2nd 3rd

Number of ways = 20

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c) (10 PTS.) In how many ways can they finish first, second, and third if B finishes in the top 3?

Example: One way is to have them finish is BED (i.e B wins, E is second, D is third).

# ways with B second = 20
first = 20
third = 20

$20+20+20 = 60$

Number of ways = 60

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d) (10 PTS.) In how many ways can they finish first, second, and third if A and B finish in the top 3?

Example: One way is to have them finish is BAD (i.e B wins, A is second, D is third).

① B A ? 4 ways (? = C, D, E or F) Answer: $4 \cdot 3 \cdot 2 \cdot 1$

② There is also B ? A, ... , ? A B

$3 \cdot 2 \cdot 1$ ways · (3! to arrange ?, A, B) Number of ways = 24

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e) (10 PTS.) In how many ways can 4 of the 6 horses be selected to be tested for drugs? Order of selection doesn't matter, only which horses are selected matters.

Example: One way is select horses C, D, E, and A.

$$C(6,4) = \frac{6!}{2!4!} = \frac{6 \cdot 5}{2!} = \frac{30}{2} = 15$$

Number of ways = 15

e) (10 PTS.) In how many ways can 3 of the 6 horses be selected to be tested for drugs? Order of selection doesn't matter, only which horses are selected matters.

Example: One way is select horses C, D, and A.

$$C(6,3) = \frac{6!}{3!3!} = \frac{6 \cdot 5 \cdot 4}{3!} = \frac{6 \cdot 5 \cdot 4}{6} = 20$$

Number of ways = 20