

SULTAN QABOOS UNIVERSITY
DEPARTMENT OF MATHEMATICS AND STATISTICS

Math3207

Fall 2013

Quiz 2

Time: 20 minutes

Name: Key: Section: ID Number:

Q1: In how many ways the letters in **MathForTeachers** can be arranged? Note that **t** and **T** should be treated as different letters. (3 points)

Solution: The letters a, h, r, and e are repeated twice. Thus, the total number of arrangements is

$$\frac{15!}{(2!)(2!)(2!)(2!)} = \frac{16!}{16}$$

Q2: In how many ways can a student register for three math courses if 6 math courses are available on the schedule? (2 points)

Solution: The student has to select three choices for six choices. It can be done in

$$\binom{6}{3} = \frac{6!}{3!3!} = 20.$$

Q3: In how many ways can a student register for three math courses if 6 math courses are on the schedule but two of them are offered at the same time? (2 points)

Solution: Here, the student cannot take two courses that are offered at the same time. So,

Method 1:

$$\binom{4}{3} \binom{2}{0} + \binom{4}{2} \binom{2}{1} = 16.$$

Method 2:

$$\binom{6}{3} - \binom{4}{1} \binom{2}{2} = 16.$$

Q4: Suppose someone has 5 different shirts and 3 different pants. How many different outfits can this person dress using these clothes? (2 points)

Solution: The total number of options is

$$(5)(3) = 15.$$

Q5: In how many ways can a committee of 6 people be chosen from 10 candidates if two candidates refuse to serve together in the same committee? (3 points)

Solution: Either we select one of those who refuse to serve together, or we select none of them. Thus, the total number of ways is

Method 1:

$$\binom{8}{5} \binom{2}{1} + \binom{8}{6} \binom{2}{0} = 140.$$

Method 2:

$$\binom{10}{6} - \binom{8}{4} \binom{2}{2} = 210 - 70 = 140.$$

Q6: Prove that $\binom{n}{k} = \binom{n}{n-k}$ (3 points)

Solution:

$$\binom{n}{n-k} = \frac{n!}{(n-k)!(n-n+k)!} = \frac{n!}{(n-k)!(k)!} = \binom{n}{k}.$$

Thus, Right Hand Side is the same as the Left Hand Side, which completes the proof.

End of Quiz

Good Luck

Total= 15 Marks