California State University Sacramento - Math 101

Quiz #11

Name: _____

1) Find the number of permutations of the letters in the given word.

(a) CATDOG

(b) ABBACATDOG

(a) $6! = 720$

(b) $\frac{10!}{3!2!}$

2) Find the number of pairs $\{a, b\}$ of distinct integers from the set $\{5, 6, 7, 8, \ldots, 20\}$ such that $|a - b| \leq 3$.

Assume $a < b$.

CASE 1: $a = 5$, $b \in \{6, 7, 8\}$

CASE 2: $a = 6$, $b \in \{7, 8, 9\}$

... CASE 13: $a = 17$, $b \in \{18, 19, 20\}$

$a = 18$, $b \in \{19, 20\}$

$a = 19$, $b \in \{20\}$

3 choices for b in each of these 13 cases

2 choices

1 choice

$3 \cdot 13 = 39$

42

3) (a) n points are placed along the circle $x^2 + y^2 = 1$ in the x, y-plane such that distance between two consecutive points along the circle is the same. Find the number of ways to take the n points and choose 3 of them to form a triangle.

(b) The weight of a 0-1 sequence of the number of 1's in the sequence. For instance, 1010100 has weight 3. Find the number of 0-1 sequences of length 9 with weight at most two.

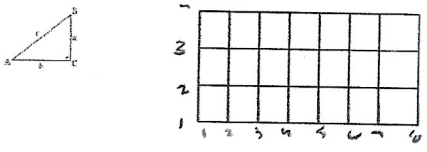
(a) $\binom{n}{3}$

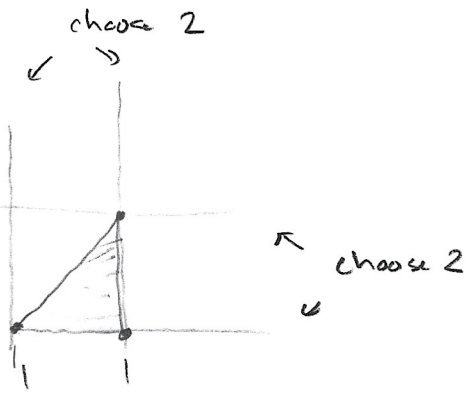
(b) $\binom{9}{0} + \binom{9}{1} + \binom{9}{2} = 1 + 9 + 36 = 46$

4) In a class of 37 students, five students are chosen to form a focus group where the focus group has one leader, and two co-leaders. How many focus groups can be formed?

$\binom{37}{5}\binom{5}{1}\binom{4}{2}$

5) Given the grid below, find the number of right triangles whose vertices are intersection points in the grid, and the right angle of the triangle is the lower right corner of the triangle.





$\binom{4}{2}\binom{8}{2}$

choose two horizontal lines

choose two vertical lines

Forms a unique right triangle