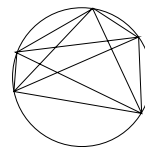


The questions:

(See handout at <http://www.math.lsu.edu/~verrill/teaching/discrete2020/handouts/week6/binomials.pdf>)

1) If there are n red cards and n blue cards (which can't be distinguished in any other way), in how many ways can the cards be dealt? E.g., if $n = 2$, we have

B, B, R, R R, B, B, R
 B, R, B, R R, B, R, B
 B, R, R, B R, R, B, B



Answer: C

Reason: Of the $2n$ cards, laid out in order, you have to choose n to be blue (then the other n are red)

2) If you put n points on the circumference of a circle, (see above for $n = 5$) and join each point to every other point, how many many triangles are there in this picture, which have all three vertices on the circumference?

Answer: E

Reason: A triangle is determined by 3 end points, so choosing 3 of the n points gives a triangle. Every triangle with end points at the point on the circle can be obtained by choosing 3 such point.

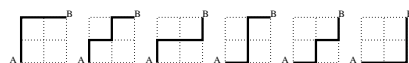
3) Same picture as above. With n points on the circumference, how many intersection points are inside the circle? Don't count points where lines meet on the circumference, and assume that there are no points where 3 lines all intersect at the same point.

Answer: B

Reason: An intersection point corresponds to choosing four points on the circle. These four points can only be joined in one way to get an intersection point of two lines in the circle.

4) If A is a point at $(0, 0)$, and B is a point at (n, m) How many paths are there from A to B , only going up or right, and only changing direction after traveling integer distances?

Possible routes when $n = 2$ and $m = 2$:



Answer: D

Reason: To get from $(0, 0)$ to (n, m) , you have to go n units right, and m units up. That's moving a total of $n + m$ units. You can choose which of these $n + m$ units moved are the m "up" movements; the rest will be right.

5) What is $a_{n,m}$ in the following expansion:

$$(x + 1)^n = x^n + a_{n,n-1}x^{n-1} + a_{n,n-2}x^{n-2} + \cdots + a_{n,1}x + 1$$

Answer: A

Reason: Note that $(1 + x)^m = (1 + x)(1 + x) \cdots (1 + x)$, where the $(1 + x)$ occurs n times. To get the coefficient of x^m , you have to pick m of the $(1 + x)$ terms to give an x . (We'll talk more about this in class.)

We'll cover the rest later!
