NCC 2014
Part F

Student name: _____

1. What is the area of the triangle with vertices at $(-2, -2)$, $(3, 0)$ and $(1, 4)$?

   Answer: _____

2. Consider the sequence $1, 2, 2, 3, 3, 3, 4, 4, 4, 4, \ldots$ (where the integer k appears k times). What is the 2014th number in the sequence?

   Answer: _____

3. What is the product of all real solutions of the equation $(x^2 + x + 47)(x^2 - 4x - 21) = 0$?

   Answer: _____

4. Let x and y be integers. How many solutions (x, y) are there to the equation $\frac{1}{x} + \frac{1}{y} = \frac{1}{4}$?
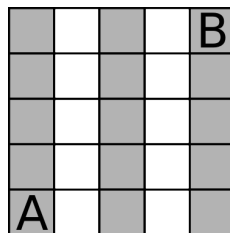
   Answer: _____

5. Alice and Bob are tossing a fair coin. Alice tosses the coin 10 times, and Bob tosses the coin 11 times. What is the probability that Bob tosses more heads than Alice?

   Answer: _____

6. In $\triangle ABC$, $AB = 1$ and $AC = \sqrt{15}$. Let D be the midpoint of side BC. If $AD = 2$, what is the area of $\triangle ABC$?

   Answer: _____

7. You start at A and want to move to B. On shaded tiles, you can only move up or right; on white tiles, you can only move down or right. How many ways are there to get from A to B?

   Answer: _____

8. There are N clowns who perform over the 4 days of a circus. Each day, some subset of the clowns perform, while all of the other clowns watch. The performers do not get to see the acts of each other on that same day. At the end of 4 days, each clown has seen the act of each other clown at least once. What is the maximum N could have been?

   Answer: _____