Relay Round

Round 1

1. The sum of two prime numbers is 25. What is their product?
2. If D, U, K, and E are distinct positive integers and $D \cdot U \cdot K \cdot E = 24 \cdot \text{TNYWR}$, what is the maximum value of $D + U + K + E$?
3. Let n be TNYWR. There are n girls and n boys at a high school dance. The first boy dances with 1 randomly chosen girl, the second boy dances with 2 randomly chosen girls, and so on, with the last boy dancing with all n girls. If Andrew and Joanna are at the dance, what is the probability that they danced together?

Round 2

1. What is the 2011^{th} digit from the right of $\frac{2010^{2010}}{3}$?
2. Let k be TNYWR. What is the remainder when $1^3 + 2^3 + 3^3 + \cdots + k^3$ is divided by 7?
3. Let $r = \text{TNYWR} + 1$. A circular sector of angle measure 144° is removed from a circle of radius r, [diagram] and the straight sides of the resulting figure are joined to form the top of a cone. What is the volume of the cone?