Directions: Complete the following problems! Your work should not be done on this paper. Make sure to show all work in order to get full credit. This assignment is due July 7th at 2:05 pm. DON'T BE LATE!

1. Determine whether the integral converges or diverges.
   \[ \int_2^\infty y e^{-3y} \, dy \]

2. Find a formula for the general term \( a_n \) of the sequence, assuming that the pattern of the first few terms continues:
   \[
   \begin{bmatrix}
   1 & -4 & 9 & -16 & 25 \\
   \frac{1}{2} & \frac{3}{4} & \frac{5}{6} & \ldots
   \end{bmatrix}
   \]

3. Determine whether the sequence converges or diverges.
   a. \( a_n = \frac{3^{n+2}}{5^n} \)
   b. \( a_n = e^{\frac{2n}{n+2}} \)
   c. \( a_n = \frac{\tan^{-1} n}{n} \)
   d. \( a_n = 2^{-n} \cos n\pi \)