HOMEWORK SET #11 / CO1A / Spring 2020

1.) Let T_m be an arbitrary, but fixed tree of m vertices. Show that $R(T_m, K_n) = 1 + (m-1)(n-1)$. (challenging)
2.) Prove that $R_k(3, 3, \ldots, 3) \leq [e \cdot k!] + 1$. (to be solved later)
3.) Show that $R_k(3, 3, \ldots, 3) \geq 2^k + 1$. (to be solved later)
4.) What is $\mathrm{ex}(n, K_3)$ (hint: what is the maximum number of edges of a bipartite graph on n vertices?
5.) Find the Ramsey number $R(C_4, C_4)$.
6.) Find the Ramsey number $R(P_4, C_7)$.
7.) Let $n > 1$ be a positive integer. Prove that $R(n + 2, 3) > 3n$.
8.) Find $R(S_5, S_5)$ where S_5 is the star on 5 vertices, that is a vertex of degree 4 joint to 4 other vertices, each of degree 1.