Math 4410 HW 5 - Due Oct. 18 in class

1. Let G be the graph on 4 vertices $\{a, b, c, d\}$ whose edges are $(a, b), (b, c), (a, c), (a, d)$, a triangle with an edge attached. What is the maximum number of edges a simple graph with n vertices, $n \geq 4$, can have without having a subgraph isomorphic to G? Describe all H such that H has this maximum number of edges without a subgraph isomorphic to G.

2. Problem 4D of the text.

3. Problem 4E of the text.

4. Let H be a (finite) simple graph. Define $P(n, H)$ to be the probability that a random simple graph with n vertices has an induced subgraph isomorphic to H. Determine

$$\lim_{n \to \infty} P(n, H).$$