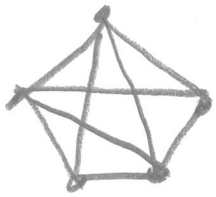
Mathematics 174

Quiz # 30 Name: Key

***You must show your work to get full credit.***

**1.** (a) Draw $K_{2,3}$.

(b) Draw $K_5$.



**2.** In a group of 21 people is is possible for each person to have exactly 7 friends? (Assume that friendship is a symmetric relation. That is if $x$ is friends with $y$, then $y$ is friends with $x$). Explain your answer.

Let G be the graph where the vertices are the people and there is an edge between them if they are friends.

Then every vertex has degree 7 and there are 21 vertices, so the total degree $= 7 \cdot 21 = 147$.

But this is impossible as the total degree is 2(# of edges) is even.

So it is impossible for each to have exactly 7 friends