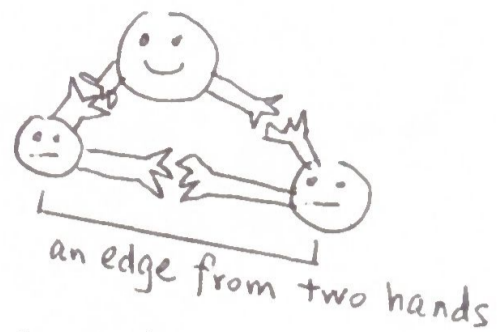


# 17 continued - Graphs

Why the name "handshaking lemma"?

Each person is a vertex.

Each handshake (pair of hands) is an edge.



Ex 1 Draw a finite, simple graph with vertices  $a, b, c, d, e$  such that:

(a)  $\deg(a) = \deg(b) = \deg(c) = 1$  and  $\deg(d) = \deg(e) = 2$ .

(b) All degrees are equal to 2.

A (a): Handshaking Lemma  $\Rightarrow |E| = \frac{1}{2} [\deg(a) + \deg(b) + \deg(c) + \deg(d) + \deg(e)]$   
 $= \frac{1}{2} [1 + 1 + 1 + 2 + 2]$   
 $= \frac{7}{2} = 3.5.$

But there can't be 3.5 edges, so such a graph cannot exist.

A (b):  $|E| = \frac{1}{2} [5 \cdot 2] = 5$  edges must be used.

possibilities:

