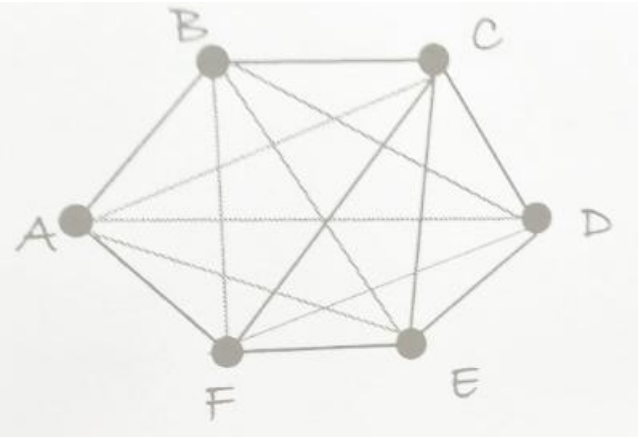
Planarity Algorithm Exercise - Solution (2 pages; 3/11/26)

(1) Use the Planarity Algorithm to show that the graph K_6 is not planar.

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Solution



We start with the Hamiltonian cycle above.

The arcs needing to be assigned to I or E are:

AC, AD, AE, BD, BE, BF, CE, CF, DF

Assign I to AC (for example).

We then consider those arcs that are remaining that cross AC.

These are BD, BE, BF.

These will have to be assigned to O, provided that they don't cross each other – which they don't.

The remaining arcs to be processed are: AD, AE, CE, CF, DF

We consider the ones that cross (one or more of) BD, BE, BF. They will then have to be assigned to I (provided that they don't cross each other).

The arcs that cross BD, BE, BF are: AD, AE, CE, CF, DF.

But AD crosses CE (for example), so we can't assign I to these arcs.

The graph is therefore non-planar.