5-3. The characteristic of a surface

A \textit{is} \begin{enumerate} \item in a \textit{surface} \end{enumerate} if it is \begin{enumerate} \item in \end{enumerate} so that

EXAMPLE

A \textit{is a} \begin{enumerate} \item graph having no \end{enumerate}

EXAMPLE

THEOREM Let \begin{enumerate} \item be a \end{enumerate} with \begin{enumerate} \item vertices and \end{enumerate} \begin{enumerate} \item edges, then

Proof

Let \begin{enumerate} \item be a \end{enumerate} that is \begin{enumerate} \item in a surface \end{enumerate} then

EXAMPLE

EXAMPLE
THEOREM Let be a graph with vertices and edges that is in (the ) with regions. Then

Proof

COROLLARY Let be a pseudograph with vertices and edges that is in with regions. Then

Proof (Exercise 5-3.)

A is anything to (that is, to )

In a every can be to a

A of a graph into a surface so that every

is a

Notation:
Remark: If is then of in any is ever a

EXAMPLE

THEOREM ( ) Let be a that is in If this of on has vertices, edges and ( ) regions, then

Proof

COROLLARY Let be a with a in with vertices, edges, and regions. Then

THEOREM Similarly, if then