Q1:

a)

Rewrite first two equations gives

Let and ,

Then , , and

Since

Similarly,

Therefore the new system of first order ordinary differential equations is:

Q3:

Assume , and are accurate.

So we get

Therefore For some , and hence .

Q4:

By the test equation,

And computed

Error:

To make the method stable, we need .  
since which is always true,

, which is only true when , this method is stable only when .