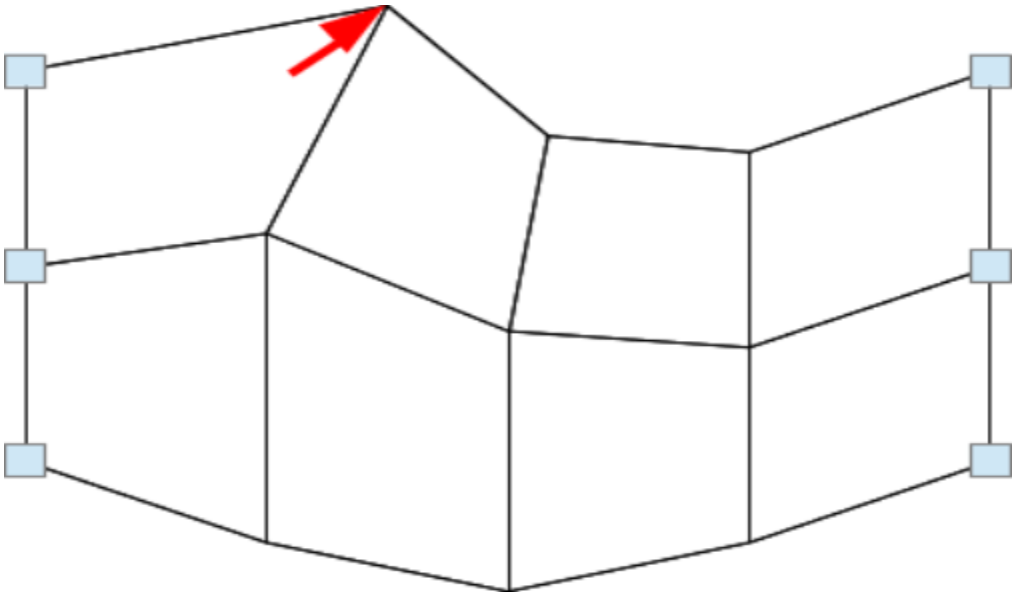
Homework #3: Mass-Spring and Implicit Methods

Write a program which creates and simulates a rectangular mass-spring network of n*m tiles, as illustrated in the following figure. The blue squares represent fixed particles. A downward gravity is applied. The user can interact with the system by repeatedly clicking, dragging and releasing arbitrary particles.



Implement three integration methods:

1. explicit Euler
2. implicit Euler
3. combination of a half step of explicit Euler and a half step of implicit Euler

Input parameters: n, m, particle mass, spring stiffness, spring damping, gravity, time step.

Compare the accuracy, stability and speed of the three methods.

References:

1. Siggraph 2001 PBM Course notes on Implicit Methods
2. For solving linear equations, you may use some libraries, for example: http://eigen.tuxfamily.org/