Solve the following boundary value problem:

$$(3 + x^3)y'' = 7xy' - 6y + 2x$$

$$\text{with boundary conditions: } y(-2) = 2 \text{ and } y(2) = -6$$

using the relaxation method.

Discretize the equation by expressing y' using a centred difference approach. It helps to write down the equation corresponding to the first line, last line, and arbitrary lines of the expression $A \cdot \vec{y} = \vec{b}$. Leave your stepsize undefined, and make sure to move all knowns into the solution vector $\vec{b}$.

Create a function [x,y] = model(xlim, ylim, stepsize) that takes arguments xlim = [-2, 2], ylim = [2,-6], and h will vary between 0.001 to 1. The function will return [x, y]. The x values and solution y at all points including the boundaries correspond to two separate vectors. Once the function is created, use it to plot a few solutions at stepsize 0.001, 0.01, 0.1, 1.

```
function  [x,y]  = model(xlim,ylim,stepsize)

    % Diagonals
    h = stepsize;
    x = [xlim(1)+h:h:xlim(end)-h]';
    lower = x.^3+3.5*x*h+3;
    upper = x.^3-3.5*x*h+3;
    centre = 6*h^2-2*(3+x.^3);

    %   Matrix & solution vectors
    A=diag(centre)+diag(lower(1:end-1),-1)+diag(upper(2:end),1);
    b = 2*h^2.*x;
    b(1)  = b(1)-lower(1)*ylim(1);
    b(end)  = b(end)-upper(end)*ylim(end);

    %   Solution
    y = A\b;

    %   Add back boundary values
    x = [xlim(1);x;xlim(end)];
    y = [ylim(1);y;ylim(end)];

end
```