Name: _

Consider the initial-value problem

 $y'' + xy' + y = 1, \ y(-1) = 2, \ y'(-1) = 1$

Let $x_0 = -1, x_1 = x_0 + h, x_2 = x_0 + 2h, \dots$ and let $y_n = y(x_n)$.

1) Write the formula for $y'(x_n)$ using the backward difference approximation.

2) Write the formula for $y''(x_n)$ using the centered difference approximation for second derivative.

3) With step size h = 0.1, find y_0 and y_1 (exactly or approximately).

4) The recursive formula for the given problem is

$$y_{n+1} = (2 - h^2 - hx_n)y_n + (hx_n - 1)y_{n-1} + h^2$$

Use the step size h = 0.1 and y_0, y_1 found above to approximate y(-0.7). If you are unable to find y_0 and y_1 in Problem 3, just pick any arbitrary values for them in order to proceed.