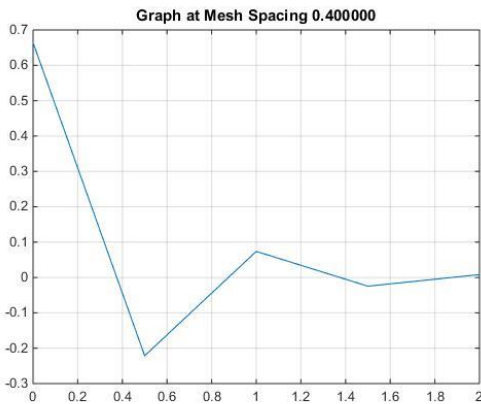
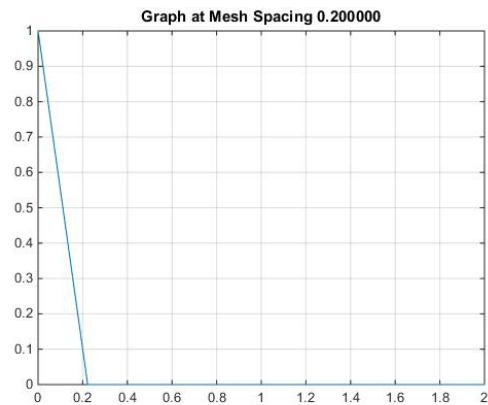
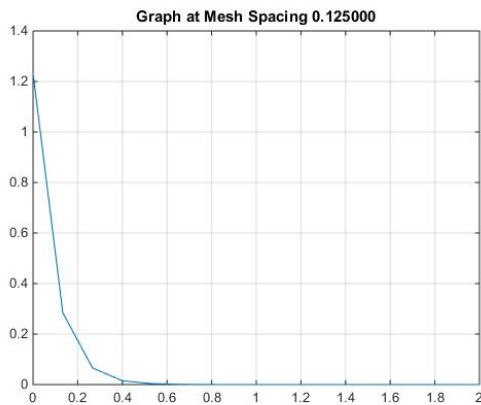
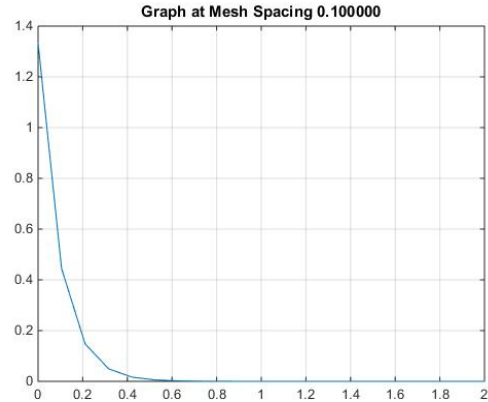
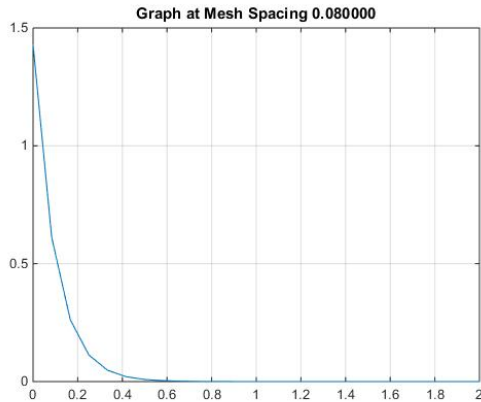


### Problem 3:

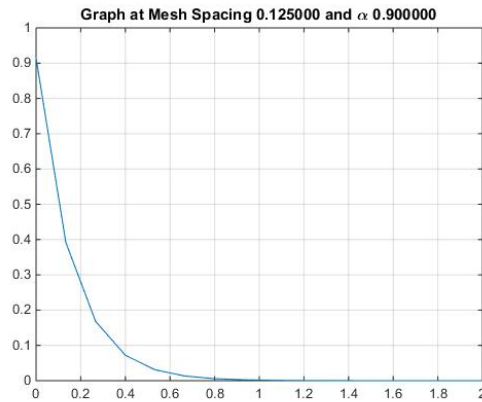
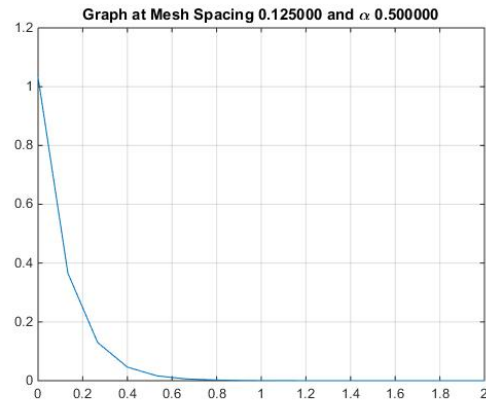
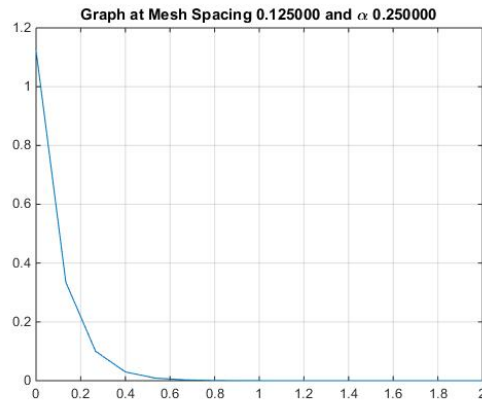
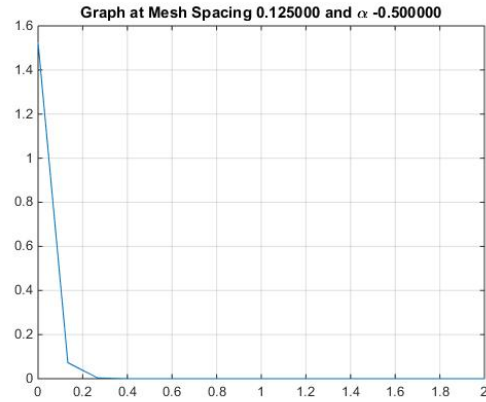
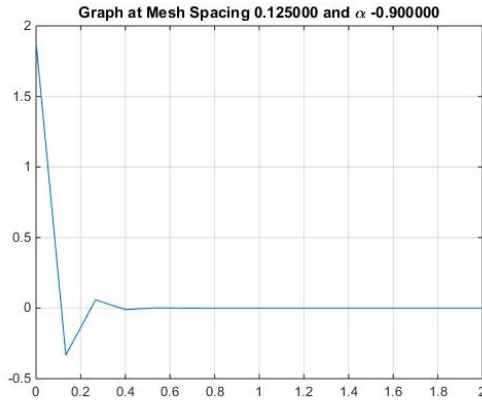
a) Cell-Centered flux:



In this case,  $\alpha = 0$  for all graphs. When  $\Delta_i = 0.4$  we observe negative flux. This is the case as requirement stated in problem 2; mesh spacing ( $\Delta_i$ )  $< 2\mu/\Sigma_t$  doesn't hold true ( $0.4 < 0.2$ ).

b) Impact of  $\alpha$  when  $\alpha = [-0.9, -0.5, 0.25, 0.5, 0.9]$ .

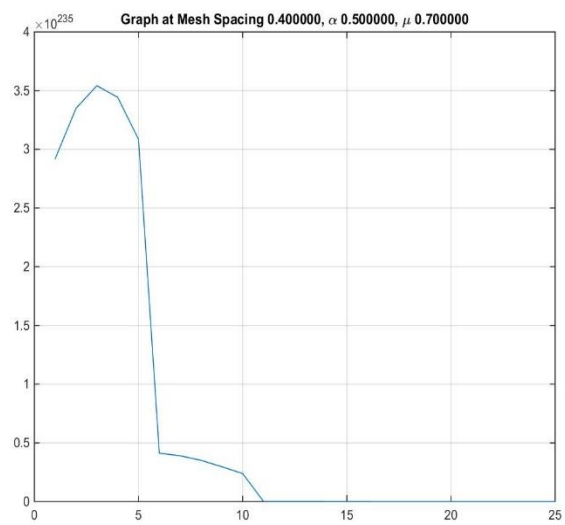
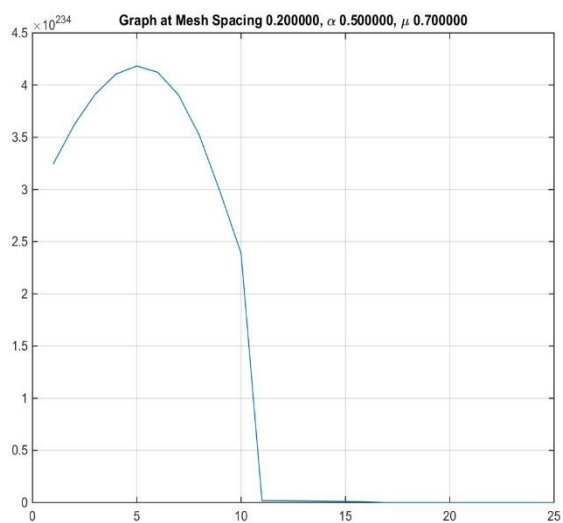
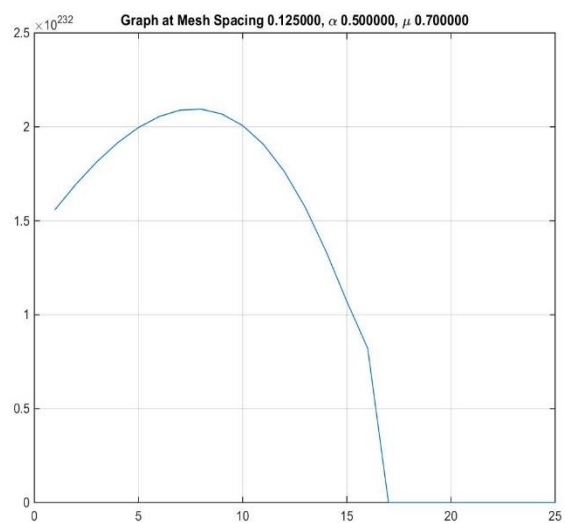
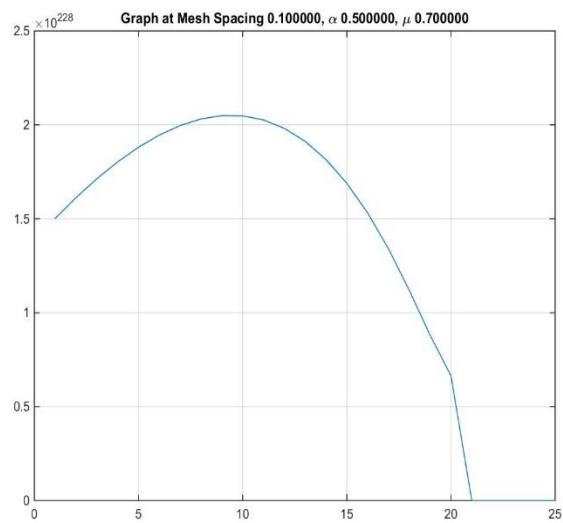
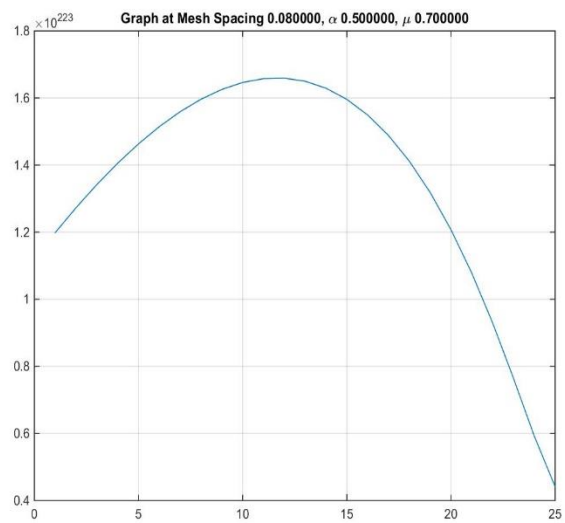
Let's look at different  $\alpha$ 's at  $\Delta_i = 0.125$ . Graphs at other  $\Delta_i$  are present in the folder.



When  $\alpha$  term is introduced, the requirement stated in problem 2 is changed by factor of  $1+\alpha$  in this case because of going  $x = 0$  to  $x = 2$ .  $\Delta_i^*(1+\alpha) < 2\mu/\Sigma_t$  should hold true to prevent negative flux.

c) Adding source:

Graphs at  $\mu = 0.7$ ,  $\alpha = 0.5$ , and for all mesh spaces here. Other graphs are in the folder.



d)  $\alpha = 0, \Sigma_s = 0.9$ :

As we increases  $\Sigma_s$ , the scalar flux increases.