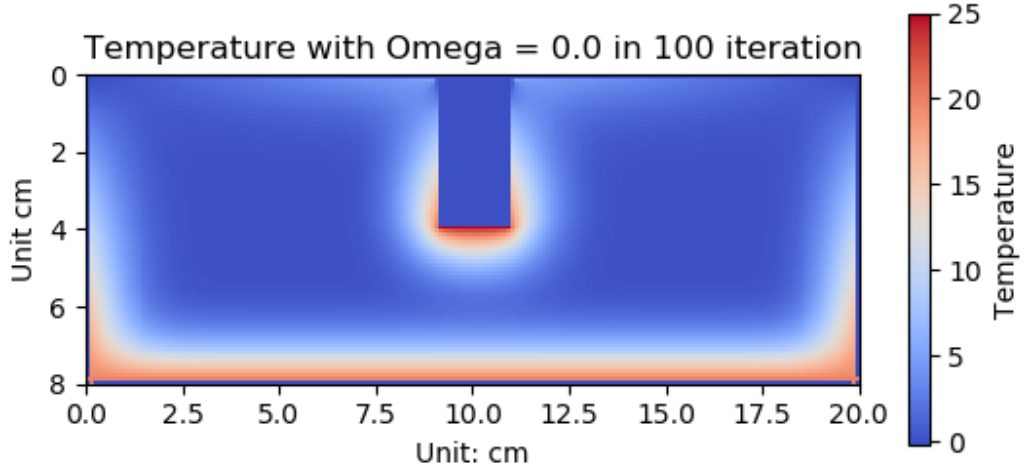
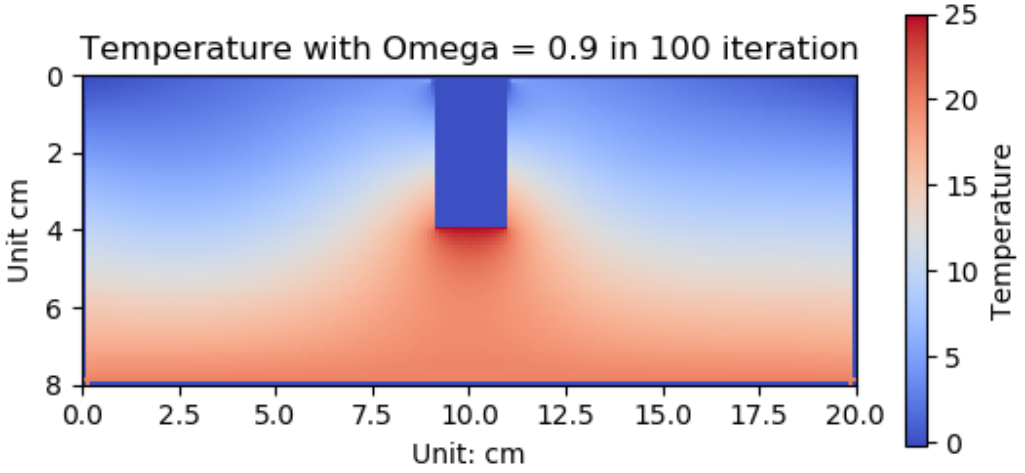
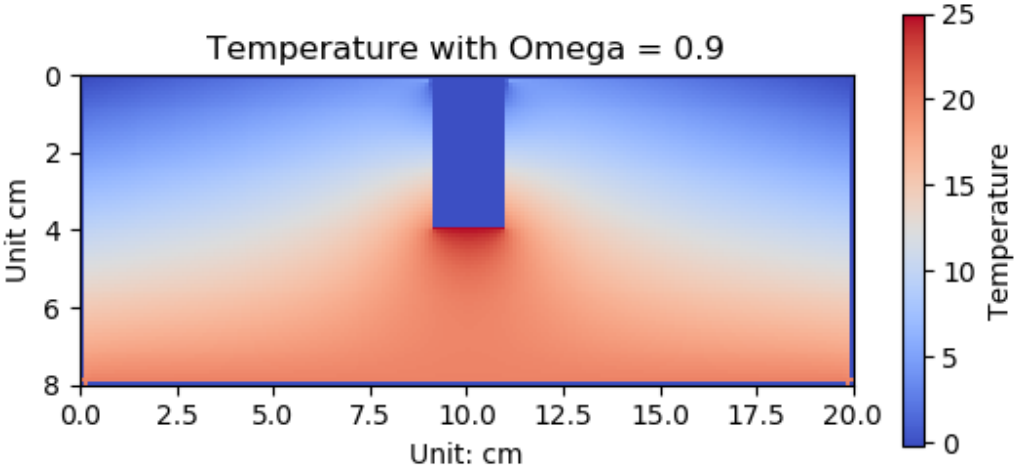
Question1:

c) The for ω = 0.9, the propagation of heat is significantly faster than the run with ω = 0.0





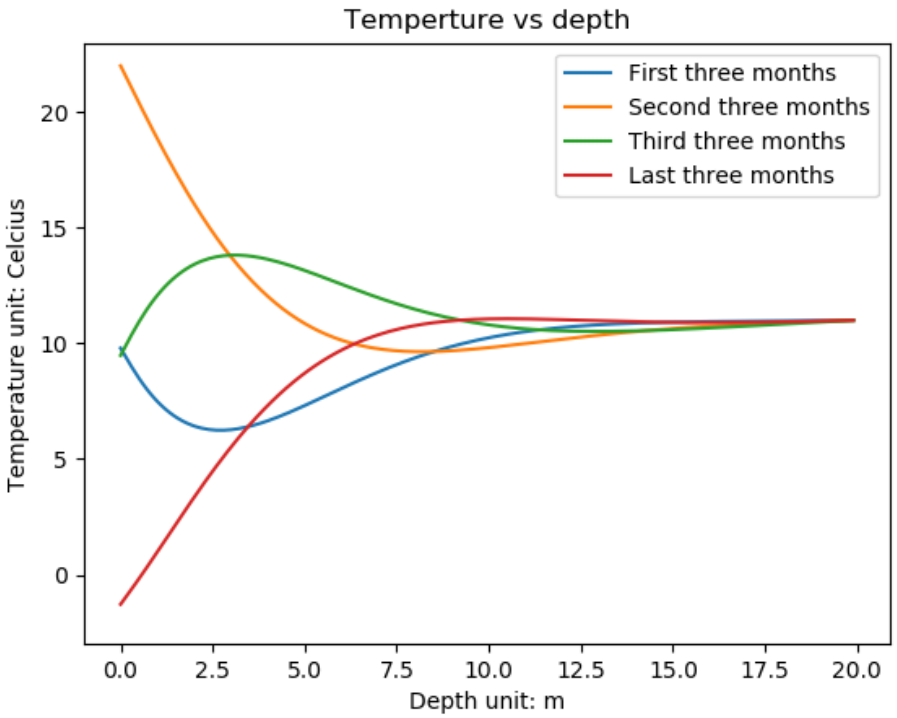
d) The temperature at point(2.5, 1) is 3.55 Celsius. The full graph is shown below:



Question2:

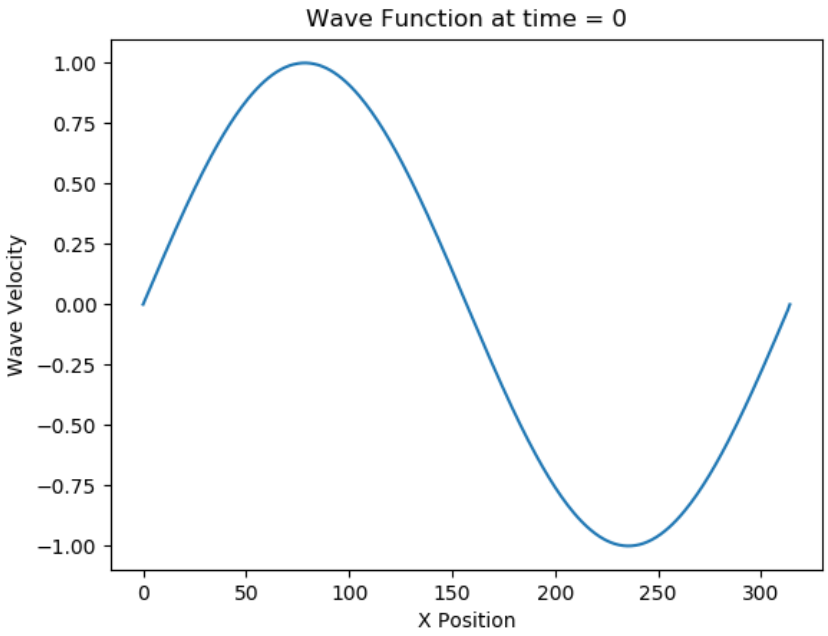
a) The code for this question is implemented in the File “lab8.py” as method *Question2()*.

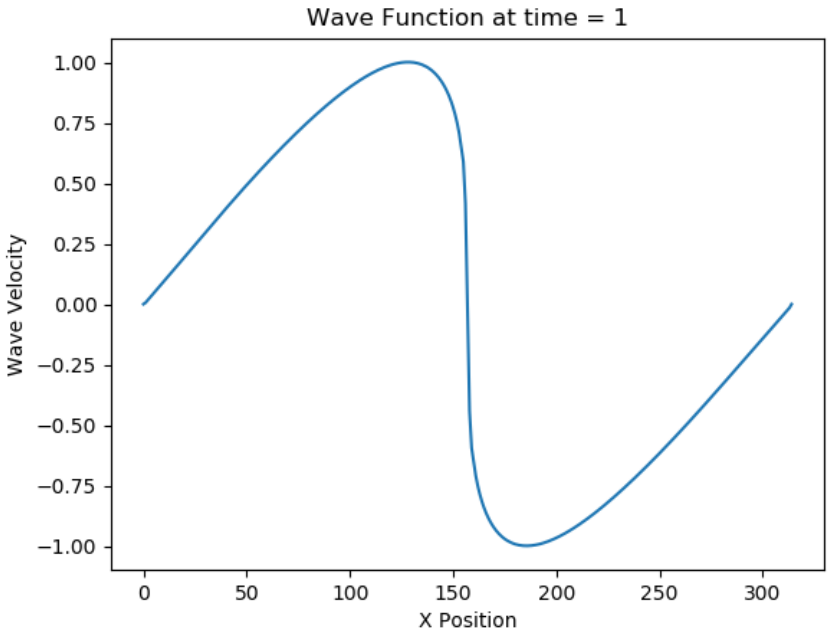
b) The graph below is generated by the program from part a

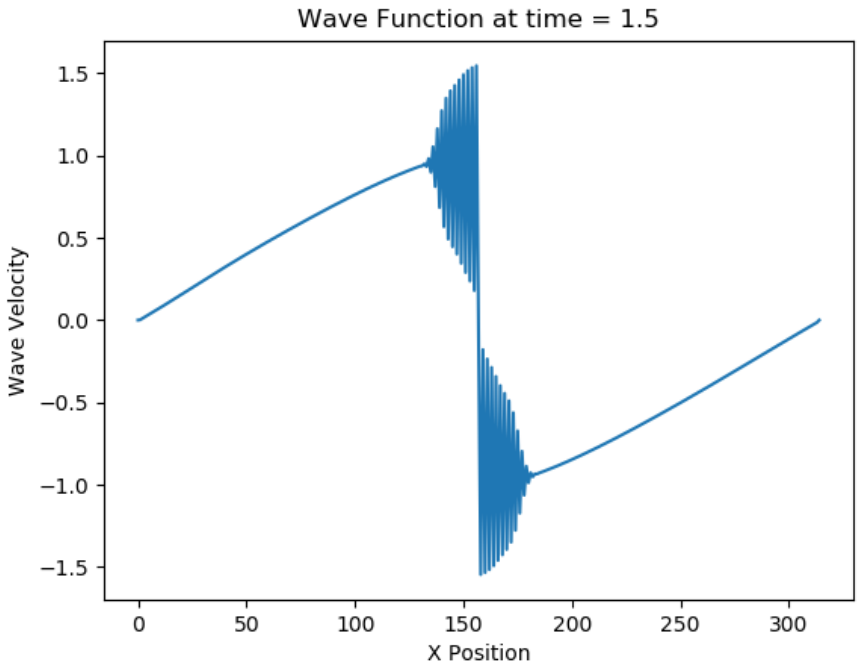


c) The graph shows that the temperature difference is very small below 10 meters under the ground. Since low temperature variance are ideal for storing wine, therefore most of the wine cellar is underground (also the temperature is lower).

Question3:


Wave Function at time = 0
Wave Velocity
X Position
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
50
100
150
200
250
300


Wave Function at time = 1
Wave Velocity
X Position
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
50
100
150
200
250
300



The graph exhibits this behavior when t = 1.5 because since when x is near 160, the graph changes nearly vertical, this cause the FTCS methods to produce a lot of numerical error, and those error escalate up and create this graph.