Question 1 [12 marks]:

Consider the instance of a discrete knapsack problem with the knapsack capacity 10 and the item information as follows:

Item	Weight	Value	Value per 1 weight
1	4	$120	$120 / 4 = $30
2	3	$600	$600 / 3 = $200
3	3	$510	$510 / 3 = $170
4	5	$540	$540 / 5 = $108

Find the most valuable subset of the items that fit into the knapsack.

We will be using the highest value per weight method
Current total weight = 0
Current value = 0

1st round taking the highest value/weight item, we will take item 2
Current total weight = 3
Current value = $600

2nd round taking the 2nd highest value/weight item, we will take item 3
Current total weight = 6
Current value = $1110

3rd round as we only have 4 capacities left, we can only take item 1
Current total weight = 10
Current value = $1230

So for this method, the current items would be item [2, 3, 1] with a total value of $1230

If we did not consider value/weight it would be
Current total weight = 0
Current value = 0

1st round we will take the highest value which is item 2
Current total weight = 3
Current value = $600

2nd round we will take the 2nd highest value which is item 4
Current total weight = 8

Current value = $1140

As the current total weight is 8, we are unable to add another item to it
So for this method, the highest value is only $1140 using item [2, 4]