**Market Equilibrium and Profit Maximization under Perfect Competition**   
 **The supply and demand equations for a hypothetical perfectly competitive market are given by  
 *QS = -*100 *+* 3*P* and *QD =* 500 *-* 2*P***.   
 **a)** **Find the market equilibrium price algebraically.   
 b) In Excel, use the above equilibrium price and the cost data from the following table to determine the   
 firm’s optimal output and its profit or loss.  
 c) For each of the following changes in market conditions, find the new market equilibrium and assess  
 the impact on the firm’s output and profit. Determine whether the firm should operate or   
 shut down in the short run. Plot the solutions. (Treat each change-scenario independently.)  
 i) To each firm, government provides $40 subsidy per unit of output produced.  
 ii) The firm’s AVC rises by $20 at each level of output due to an increase in material costs.  
 iii) Market demand increases, changing the original demand equation to: *QD =* 600 *-* 2*P***.

**Total Total**  **Total fixed variable**

**Output cost cost**

0 $100 $ 0

1 100 100

2 100 180

3 100 240

4 100 320

5 100 440

6 100 600

7 100 800

8 100 1040

9 100 1340

10 100 1800