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| 1. Assume that a competitive firm has the total cost function:TC = 1q3 - 40q2 + 890q + 1800Suppose the price of the firm's output (sold in integer units) is $600 per unit.**Using tables (but not calculus) to find a solution, what is the total profit at the optimal output level?**Please specify your answer as an integer. |

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| 2. Assume that a competitive firm has the total cost function:TC = 1q3 - 40q2 + 880q + 2000Suppose the price of the firm's output (sold in integer units) is $550 per unit.Using calculus and formulas (but no tables and restricting your use of spreadsheets to implementing the quadratic formula) to find a solution, how many units should the firm produce to maximize profit?Please specify your answer as an integer.Hint: The first derivative of the total cost function is the marginal cost function.Set the marginal cost equal to the marginal revenue (price in this case) to define an equation for the optimal quantity q.Rearrange the equation to the quadratic form aq2 + bq + c = 0.Use the quadratic formula to solve for q:http://www.mbamath.com/images/quadratic_formula.gifFor non-integer quantity, round up and down to find the optimal value.3. Suppose a competitive firm has as its total cost function:TC = 17 + 2q2Suppose the firm's output can be sold (in integer units) at $57 per unit.Using calculus and formulas (but no tables or spreadsheets) to find a solution, how many units should the firm produce to maximize profit?Please specify your answer as an integer. In the case of equal profit from rounding up and down for a non-integer initial solution quantity, enter the higher quantity. |
| 4. Assume that the demand curve D(p) given below is the market demand for apples:Q = D(p) = 280 - 13p, p > 0Let the market supply of apples by given by:Q = S(p) = 44 + 5p, p > 0where p is the price (in dollars) and Q is the quantity. The functions D(p) and S(p) give the number of bushels (in thousands) demanded and supplied.**What is the equilibrium quantity in this market?**Round the equilibrium price to the nearest cent and round the equilibrium quantity DOWN to its integer part.5. The demand curve for tickets at an amusement park is:Q = D(p) = 1200 - 49p, p > 0The marginal cost of serving a customer is $18.**Using calculus and formulas (but no tables or spreadsheets) to find a solution, how many tickets will be sold at the profit-maximizing price?**Round the equilibrium quantity DOWN to its integer part and round the equilibrium price to the nearest cent. |

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| 6. Assume that the demand curve D(p) given below is the market demand for apples:Q = D(p) = 280 - 13p, p > 0Let the market supply of apples by given by:Q = S(p) = 44 + 5p, p > 0where p is the price (in dollars) and Q is the quantity. The functions D(p) and S(p) give the number of bushels (in thousands) demanded and supplied.**What is the equilibrium quantity in this market?**Round the equilibrium price to the nearest cent and round the equilibrium quantity DOWN to its integer part.7. The demand curve for tickets at an amusement park is:Q = D(p) = 1200 - 49p, p > 0The marginal cost of serving a customer is $18.**Using calculus and formulas (but no tables or spreadsheets) to find a solution, how many tickets will be sold at the profit-maximizing price?**Round the equilibrium quantity DOWN to its integer part and round the equilibrium price to the nearest cent. |

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