ECON 331 Tutorial Questions: 2 Variable optimization

Make Sure to check second order conditions for all solutions MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) A monopolist produces two products, *A*, and *B*. The joint-cost function is $c = 5q_A + 3q_B + 5000$ 1) where *c* is the total cost of producing q_A units of *A* and q_B units of *B*. the demand functions for these products are given by $p_A = 205 - 2q_A - q_B$ and $p_B = 153 - q_A - q_B$, where p_A and p_B are the prices of *A* and *B*, respectively. The number of units of *A* and the number of units *B* that should be sold to maximize the monopolist's profit is
 - A) 75 units of *A* and 100 units of *B*.
 - B) 15 units of *A* and 25 units of *B*.
 - C) 50 units of *A* and 75 units of *B*.
 - D) 10 units of *A* and 15 units of *B*.
 - E) 25 units of *A* and 50 units of *B*.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

2) Determine the critical points of $f(x, y) = 3x^2 + 4y^2 - 2x + 8y$ and also determine by the	2)
	second-derivative test whether each point corresponds to a relative maximum, to a relative minimum, to neither, or whether the test gives no information.	
3)	Determine the critical points of $f(x, y) = 4x^2 + 2x - y^2 + 2y$ and also determine by the	3)
	relative minimum, to neither, or whether the test gives no information.	
4)) Determine the critical points of $f(x, y) = 2xy - 3x - y - x^2 - 3y^2$ and also determine by the second-derivative test whether each point corresponds to a relative maximum to a	4)
	relative minimum, to neither, or whether the test gives no information.	
5)) Determine the critical points of $f(x, y) = x^2 + 2xy + 2y^2 - 4y$ and also determine by the	5)
	relative minimum, to neither, or whether the test gives no information.	
6) Determine the critical points of $f(x, y) = x^3 + \frac{1}{2}y^2 - 3xy - 4y + 2$ and also determine by the	6)
	second-derivative test whether each point corresponds to a relative maximum, to a relative minimum, to neither, or whether the test gives no information.	
7) A manufacturer produces products A and B for which the average costs of production are constant at 3 and 5 (dollars per unit), respectively. The quantities q_A , q_B of A and B that	7)
	can be sold each week are given by the joint-demand functions $\frac{q_A = 10 - p_A + p_B}{q_B = 12 + p_A - 3p_B}$	
	where p_A and p_B are the prices (in dollars per unit) of <i>A</i> and <i>B</i> , respectively. Determine the	
	prices of A and B at which the manufacturer can maximize profit.	
8)	Determine all of the critical points of $f(x, y) = x^3 + 3x^2 - 9x + y^3 - 12y$. Also use the second	8)
	derivative test to determine, if possible, whether a maximum, minimum or saddle point occurs at each of these critical points.	

9) Determine all of the critical points of $f(x, y) = \frac{1}{3}x^3 + x^2 - 3x + \frac{1}{3}y^3 - 4y$. Also use the

second derivative test to determine, if possible, whether a maximum, minimum or saddle point occurs at each of these critical points.

10) A television manufacturing company makes two types of TV's. The cost of producing x units of type A and y units of type B is given by the function $C(x, y) = 100 + x^3 + 64y^3 - 96xy$. How many units of type A and type B televisions should the company produce to minimize its cost?

9)

10)