MAT 211 **Exam 1, Form A**

Instructor: **Student's Name: _____**

Honor Statement

By signing below you confirm that you have neither given nor received any unauthorized assistance on this exam. This includes any use of a graphing calculator beyond those uses specifically authorized by the Mathematics Department and your instructor. Furthermore, you agree not to discuss this exam with anyone until the exam testing period is over. In addition, your calculator's memory and menus may be checked at any time and cleared by any testing center proctor or Mathematics Department instructor.

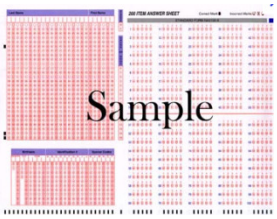
_____ _____

Signature Date

Instructions

Circle your answer choice on the exam AND fill in the Scantron with the letter of the answer that you believe is the correct answer.
The test consists of 7 multiple choice problems and 3 free response problems.
No calculators like the Casio FX-2, TI-89 or TI-92 that do symbolic algebra may be used.
Proctors reserve the right to check calculators.
The usage of cell phones is prohibited. TURN YOUR CELL PHONE OFF! Do not allow your cell phone to ring while you are taking the exam. Do not use the calculator on your cell phone. If a proctor sees you using a cell phone, they may take your exam.

Fill Multiple Choice Part on Scantron!



1. Evaluate g((1, 0, -1) for

$$g(x,y,z)=\frac{2xyz}{x^2+y^2+z^2}$$

a. 1
b. -1
c. 0
d. 2
e. 4

2. Your weekly cost (in dollars) to manufacture *x* cars and *y* trucks is

$$C(x,y) = 280,000 + 5,000x + 4,000y$$

What is the marginal cost of a truck?

a. $285,000
b. $5,000
c. $4,000
d. $2,000
e. $284,000

3. Calculate $\frac{\partial f}{\partial x}\Big|_{(5,8)}$ and $\frac{\partial f}{\partial y}\Big|_{(5,8)}$ when defined.

$$f(x,y)=x^2y^3-x^3y^2-xy$$

a. $\left.\frac{\partial f}{\partial x}\right|_{(5,8)} = 312, \left.\frac{\partial f}{\partial y}\right|_{(5,8)} = 2795$

b. $\left.\frac{\partial f}{\partial x}\right|_{(5,8)} = -312, \left.\frac{\partial f}{\partial y}\right|_{(5,8)} = -2800$

c. $\left.\frac{\partial f}{\partial x}\right|_{(5,8)} = 2795, \left.\frac{\partial f}{\partial y}\right|_{(5,8)} = 312$

d. $\left.\frac{\partial f}{\partial x}\right|_{(5,8)} = 320, \left.\frac{\partial f}{\partial y}\right|_{(5,8)} = 2800$

e. $\left.\frac{\partial f}{\partial x}\right|_{(5,8)} = -312, \left.\frac{\partial f}{\partial y}\right|_{(5,8)} = 2800$

4. Calculate $\frac{\partial^2 f}{\partial x^2}$ and $\frac{\partial^2 f}{\partial y \partial x}$ when defined.

$f(x,y) = 7x^{0.5}y^{0.1}$

a. $\frac{\partial^2 f}{\partial x^2} = -3.5y^{0.1}x^{-1.5}, \frac{\partial^2 f}{\partial y \partial x} = 3.5y^{-0.9}x^{-0.5}$

b. $\frac{\partial^2 f}{\partial x^2} = -3.5y^{0.1}x^{-0.5}, \frac{\partial^2 f}{\partial y \partial x} = 0.7y^{-0.9}x^{0.5}$

c. $\frac{\partial^2 f}{\partial x^2} = -7y^{-0.9}x^{-1.5}, \frac{\partial^2 f}{\partial y \partial x} = 7y^{-1.9}x^{-0.5}$

d. $\frac{\partial^2 f}{\partial x^2} = -1.75y^{0.1}x^{-1.5}, \frac{\partial^2 f}{\partial y \partial x} = 0.35y^{-0.9}x^{-0.5}$

e. $\frac{\partial^2 f}{\partial x^2} = 1.75y^{0.1}x^{-1.5}, \frac{\partial^2 f}{\partial y \partial x} = -0.35y^{0.9}x^{0.5}$

5. Calculate $\frac{\partial f}{\partial x}$, $\frac{\partial f}{\partial y}$, and $\frac{\partial f}{\partial z}$ when defined.

$f(x,y) = x^{0.9}y^{0.3}x^{0.6}$

a. $\frac{\partial f}{\partial x} = 0.9x^{-0.1}y^{0.3}z^{0.6}, \frac{\partial f}{\partial y} = 0.3x^{0.9}y^{-0.7}z^{0.6}, \frac{\partial f}{\partial z} = 0.6x^{0.9}y^{0.3}z^{-0.4}$

b. $\frac{\partial f}{\partial x} = 0.3x^{-0.7}y^{0.3}z^{0.6}, \frac{\partial f}{\partial y} = 0.3x^{0.9}y^{-0.1}z^{0.6}, \frac{\partial f}{\partial z} = 0.6x^{0.3}y^{0.9}z^{-0.4}$

c. $\frac{\partial f}{\partial x} = 0.9x^{-0.1}y^{0.3}z^{0.6}, \frac{\partial f}{\partial y} = 0.3x^{0.9}y^{-0.4}z^{0.3}, \frac{\partial f}{\partial z} = 0.6x^{0.9}y^{0.6}z^{-0.7}$

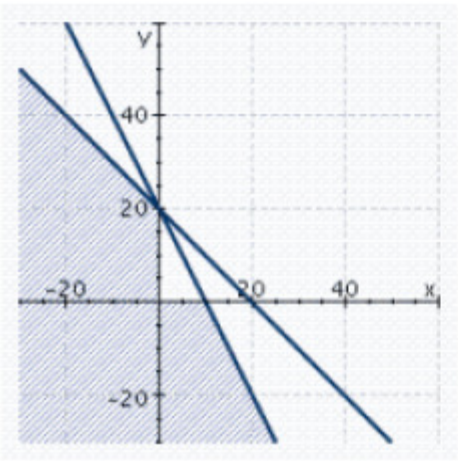
d. $\frac{\partial f}{\partial x} = 0.9x^{-0.1}y^{0.7}z^{0.4}, \frac{\partial f}{\partial y} = 0.3x^{0.9}y^{-0.7}z^{0.6}, \frac{\partial f}{\partial z} = 0.6x^{0.9}y^{0.3}z^{-0.4}$

e. $\frac{\partial f}{\partial x} = 0.9x^{-0.1}y^{0.3}z^{0.6}, \frac{\partial f}{\partial y} = 0.3x^{0.9}y^{-0.3}z^{0.6}, \frac{\partial f}{\partial z} = 0.6x^{0.9}y^{0.3}z^{-0.6}$

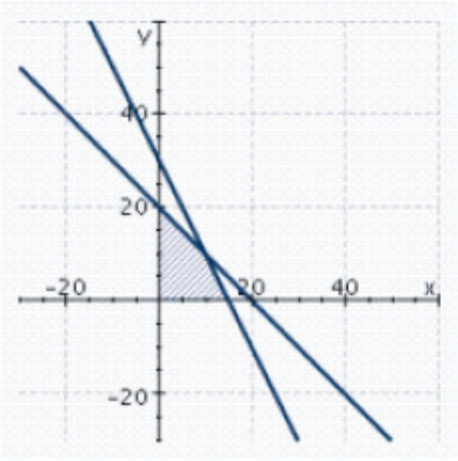
6. A region is defined by the set of inequalities. Which graph satisfies the solution to these inequalities?

$$\begin{aligned} 2x + y &\le 30 \\ x + y &\le 20 \\ x \ge 0, y &\ge 0 \end{aligned}$$

a.


y
40
20
-20
20
40
x
-20

b.


y
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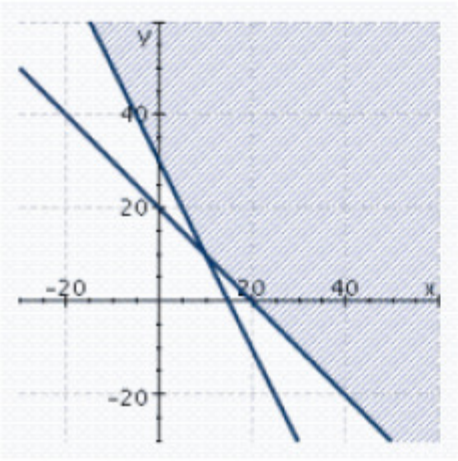
20
40
x
-20

c.


y
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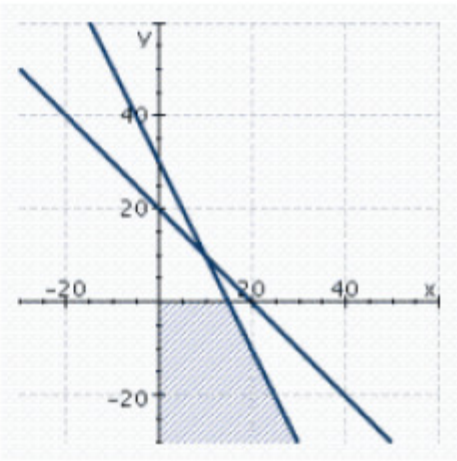
-20
20
40
x
-20

d.


y
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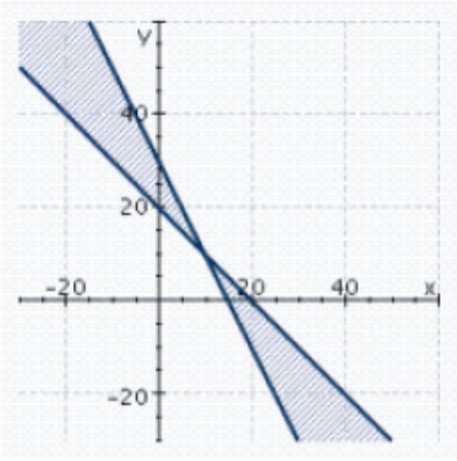
x
-20

e.


y
40
20
-20
20
40
x
-20

7. Solve the linear programming problem.

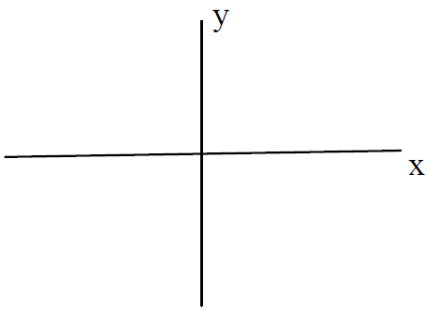
Maximize	$P = 4x + 7y$
subject to	$x + y \le 4$
	$2x + y \le 5$
	$x \ge 0, y \ge 0$

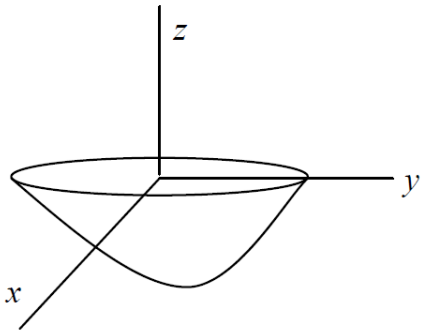
a. $x = 0, y = 4, P = 28$
b. $x = 1, y = 0, P = 25$
c. $x = 2.5, y = 0, P = 10$
d. $x = 0, y = 5, P = 35$
e. $x = 1, y = 3, P = 25$

Free Response

1. Draw 3 level curves (contours) for the following function. Show your work, i.e. show how you obtained the equations of the level curves. Use an appropriate scale. Label each level curve with the corresponding z-value. Show the scale on the x- and y-axes, Look at the sketch of the surface. Use the given spaces. The graph of the surface is given.

$$z = -\sqrt{9 - x^2 - y^2}$$





2. Find the absolute minimum and maximum of the function

$$f(x,y) = -5x^2 + 4y^2 + 6x + 6y + 12$$

on the region bounded by 3 lines: the line with equation $x = -3$, the line with equation $y = 3$, and the line with equation $x - y = 10$.

3. Miss Persida Budau, the owner of Slatina Jeans Inc., decided to branch out into home décor and opened up a factory where she produces two types of decorative lamps made out of Emu eggshells. Let *x* represent the number of table lamps and *y* represent the number of floor lamps produced and sold. Her weekly revenue function is given by . As Miss Budau's consultant, help her with the following: $R(x,y) = -x^2 - xy - y^2 + 35x + 40y + 150$

Find the values of *x* and *y* that maximize the weekly revenue, and give the revenue as well. Assume there are no constraints.