Module 8 Problem Set

Due Mar 7 by 9:59pm **Points** 15 **Submitting** an external tool **Available** Feb 28 at 10pm - Mar 20 at 9:59pm 20 days

Review Assessment Attempts

Uber, Jacques

Module 8 Problem Set

Started: 3/2/21, 7:22 pm
Last Changed: 3/3/21, 9:10 pm
Total time questions were on-screen: 438.4 minutes

Due Date: Sun 3/7/21, 9:59 pm

Score in Gradebook: 15/15

Grade is calculated on the best version of each question

Scored attempt. Score: **15/15.**

Question 1. Version 1*/1. Score: **1/1**

Let $f(x, y) = 7x - 6y + 8$. Find the following values of $f(x, y)$ for the given coordinates.

$f(-4, 1)$ = -26

$f(-5, 0)$ = -27

$f(0, 6)$ = -28

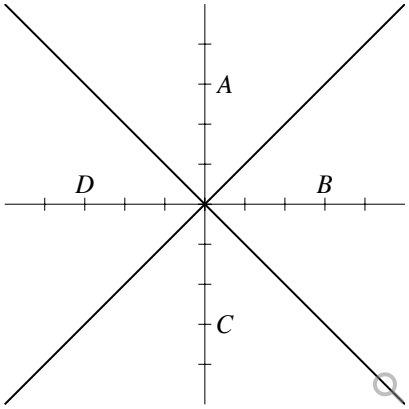
$f(1, 3)$ = -3

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 18.2 minutes.
Message instructor

Question 2. Version 1*/1. Score: **1/1**

Let $f(x, y) = \sqrt{x + y}$

Which of the following regions are in the domain of f?



- [x] A
- [x] B
- [ ] C
- [ ] D

Score: 1/1
Time spent on this version: 0.9 minutes.
Message instructor

Question 3. Version 1*/1. Score: **1/1**

Find the limit. Enter DNE if the limit does not exist.

$$\lim_{(x,y)\to(0,0)} \frac{x^2y}{x^2+12y^2} = 0$$

Score: 1/1
Time spent on this version: 4.9 minutes.
Message instructor

Question 4. Version 1*/1. Score: **1/1**

Given $f(x,y) = y\ln(5x - 3y)$, find

$f_x(x,y) = \frac{5y}{(5x-3y)}$

$f_y(x,y) = \frac{-3y+(5x-3y)\ln(5x-3y)}{5x-3y}$

Score: 0.5/0.5 0.5/0.5
Time spent on this version: 4 minutes.
Message instructor

Question 5. Version 1*/1. Score: **1/1**

Suppose that the manufacturing cost of a particular item is approximated by `M(x,y) = 3x^3-x^2y^4-4y^5`, where `x` is the cost of materials and `y` is the cost of labor. Find the following:

`M_(x)(x,y)` = $9x^2 - 2xy^4$

`M_(y)(x,y)` = $-4x^2y^3 - 20y^4$

`M_(x x)(x,y)` = $2\left(9x - y^4\right)$

`M_(x y)(x,y)` = $-8xy^3$

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 3 minutes.
Message instructor

Question 6. Version 2*/2. Score: **1/1**

Find the tangent plane to the equation `z = 4 e^(x^2 - 2 y)` at the point `(4,8,4)`

`z` = $32x - 8y - 60$

Score: 1/1
Time spent on this version: 3.6 minutes.
Message instructor

Question 7. Version 1*/1. Score: **1/1**

Find the linear approximation to `f(x,y) = 4 sqrt((x y)/12)` at the point `(8,6,8)`, and use it to approximate `f(8.24,6.2)`

`f(8.24,6.2) ~=` 8.2533

Round your answer to four decimal places as needed.

Score: 1/1

Time spent on this version: 3.9 minutes.
Message instructor

Question 8. Version 1*/1. Score: **1/1**

Find `(dz)/(dt)` given:

`z = x e^(5 y), \quad x = t^4, \quad y = -3 + 2 t`

`(dz)/(dt)` = $t^3e^{10t-15}(10t+4)$

Your answer should only involve the variable *t*

Score: 1/1
Time spent on this version: 2 minutes.
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Question 9. Version 1*/1. Score: **1/1**

The pressure `P` (in kilopascals), volume `V` (in liters), and temperature `T` (in kelvins) of a mole of an ideal gas are related by the equation `PV = 8.31T`, where `P`, `V`, and `T` are all functions of time (in seconds). At some point in time the temperature is 310 K and increasing at a rate of 0.15 K/s and the pressure is 29 and increasing at a rate of 0.09 kPa/s. Find the rate at which the volume is changing at that time.

-0.233 L/s

Round your answer to four decimal places as needed.

Score: 1/1
Time spent on this version: 58.5 minutes.
Message instructor

Question 10. Version 2*/2. Score: **1/1**

Suppose that `f(x,y) =2x^4+2y^4-x y`.

Then the minimum value of `f` is $-\frac{1}{16}$

Round your answer to four decimal places as needed.

Score: 1/1
Time spent on this version: 0.8 minutes.
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Question 11. Version 1*/1. Score: **1/1**

Let `f(x,y) = x^3 + y^3 + 15 x^2 - 18 y^2 - 1`.

List the saddle points $(-10,12),(0,0)$

A local minimum occurs at $(0,12)$

The value of the local minimum is -865

A local maximum occurs at $(-10,0)$

The value of the local maximum is 499

Score: 0.2/0.2 0.2/0.2 0.2/0.2 0.2/0.2 0.2/0.2
Time spent on this version: 4.9 minutes.
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Question 12 Version 2*/2. Score: 1/1

Question 12. Version 2*/2. Score: 1/1

Given `S(x,y)=4x+9y-3x^2-6y^2-5xy`, answer the following questions:

(a) Find the first partial derivatives of `S`.

`S_x(x,y)=` $-6x-5y+4$

`S_y(x,y)=` $-5x-12y+9$

(b) Find the values of `x` and `y` that maximize `S`. Round to four decimal places as needed.

`x` = $\frac{3}{47}$

`y` = $\frac{34}{47}$

Score: 0.25/0.25 0.25/0.25 0.25/0.25 0.25/0.25
Time spent on this version: 1.7 minutes.
Message instructor

Question 13. Version 2*/2. Score: **1/1**

An open-top rectangular box is being constructed to hold a volume of 300 in^3. The base of the box is made from a material costing 5 cents/in^2. The front of the box must be decorated, and will cost 10 cents/in^2. The remainder of the sides will cost 3 cents/in^2.

Find the dimensions that will minimize the cost of constructing this box. Round your answers to two decimal places as needed.

Front width: 5.5 in.

Depth: 11.911 in.

Height: 4.581 in.

Score: 0.333/0.333 0.333/0.333 0.333/0.333
Time spent on this version: 0.9 minutes.
Message instructor

Question 14. Version 1*/1. Score: **1/1**

A firm manufactures a commodity at two different factories, Factory X and Factory Y. The total cost (in dollars) of manufacturing depends on the quantities, `x` and `y` produced at each factory, respectively, and is expressed by the *joint cost function*:

$$C(x,y)=1x^2 + xy + 2y^2 + 1300$$

A) If the company's objective is to produce 1,700 units per month while minimizing the total monthly cost of production, how many units should be produced at each factory? (Round your answer to whole units, i.e. no decimal places.)

To minimize costs, the company should produce:

1275 at Factory X and

425 at Factory Y

B) For this combination of units, their minimal costs will be 2530050 dollars. (Do not enter any commas in your answer.)

Score: 0.4/0.4 0.4/0.4 0.2/0.2
Time spent on this version: 4.5 minutes.
Message instructor

Question 15. Version 1*/1. Score: **1/1**

A chemical manufacturing plant can produce `z` units of chemical Z given `p` units of chemical P and `r` units of chemical R, where:

$$z=10p^{.8}r^{0.2}$$

Chemical P costs $400 a unit and chemical R costs $2,000 a unit. The company wants to produce as many units of chemical Z as possible with a total budget of $300,000.

A) How many units each chemical (P and R) should be "purchased" to maximize production of chemical Z subject to the budgetary constraint?

Units of chemical P, `p` = 600

Units of chemical R, `r` = 30

B) What is the maximum number of units of chemical Z under the given budgetary conditions? (Round your answer to the nearest whole unit.)

Max production, `z`= 3295 units

Score: 0.4/0.4 0.4/0.4 0.2/0.2
Time spent on this version: 56.2 minutes.
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Feedback:

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