Bilkent University

Quiz # 5
Math 102-Section 09
28 April 2023, Friday, Moodle Quiz
Instructor: Ali Sinan Sertöz
**Solution Key**

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**Q-1)** Consider the function

$$f(x,y) = \sin(x+23y) - e^{x-23y}.$$

(a) Calculate $f_x(x,y)$.

(b) Calculate $f_{xx}(x,y)$.

(c) Calculate $f_y(x,y)$.

(d) Calculate $f_{yy}(x,y)$.

(e) Does there exist a constant $c$ such that $f_{xx}(x,y) + cf_{yy}(x,y) = 0$? If *yes* find this constant. If *no*, explain why.

Show your work in detail. Correct answers without detailed explanation do not get any credit.

Grading: 2+2+2+2+2=10 points.

**Solution:**

**(1-a)** $f_x(x,y) = \cos(x+23y) - e^{x-23y}$.

**(1-b)** $f_{xx}(x,y) = -\sin(x+23y) - e^{x-23y}$.

**(1-c)** $f_y(x,y) = 23\cos(x+23y) + 23e^{x-23y}$.

**(1-d)** $f_{yy}(x,y) = -529\sin(x+23y) - 529e^{x-23y}$.

**(1-e)** $f_{xx}(x,y) + cf_{yy}(x,y) = -(1+529c)(\sin(x+23y) + e^{x-23y}) = 0$ gives $c = -1/529$.