

# Math 253, Section 102, Fall 2006

## Quiz 4, October 11

Name:

SID:

### Instructions

- The total time is 20 minutes.
- The total score is 25 points.
- Use the reverse side of each page if you need extra space.
- Show all your work. A correct answer without intermediate steps will receive no credit.
- Calculators and cheat sheets are not allowed.

<b>Problem</b>	<b>Points</b>	<b>Score</b>
1	9	
2	6	
3	10	
<b>TOTAL</b>	25	

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1. Show that the function  $u(x, t) = \sin(kx) \sin(akt)$  is a solution of the wave equation

$$u_{tt} = a^2 u_{xx}.$$

(9 points)

2. You are told that there is a function  $f$  whose partial derivatives are

$$f_x(x, y) = x + 4y, \quad f_y(x, y) = 3x - y.$$

Either find  $f$  or show that such a function does not exist. State clearly any result that you use in your solution.

(6 points)

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3. Find the linear approximation of the following function:

$$f(x, y) = \sqrt{20 - x^2 - 7y^2}$$

at the point  $(2, 1)$ .

(10 points)