

General instructions: give exact answers to all problems unless otherwise noted. Simplify all answers completely.

Math& 163 Big List of Homework, part three.

K. Recommended book problems: 14.1 / 1, 2, 5, 6, 10, 30 (give reasons!), 41, 42, 45, 56, 59. Turn in:

1. Consider the function $f(x, y) = \frac{1}{\sqrt{16 - x^2 - y^2}}$.
 - (a) Find and graph the domain of the function.
 - (b) Find the range of the function.
 - (c) Sketch the level curves $f(x, y) = C$ for $C = 1, 2, 3, 1/2, 1/3, 1/4$. (preferably all in one graph)
2. Consider the function $g(x, y) = \tan^{-1}\left(\frac{y}{x}\right)$.
 - (a) Find the domain of the function.
 - (b) Find the range of the function.
 - (c) Sketch the level curve $g(x, y) = \frac{\pi}{4}$.

L. Recommended book problems: 14.3 / 1, 3, 5, 10, 15, 16, 19-33 odd, 40, 41, 52, 55, 62, 65, 69, 81 (maybe you want to use implicit differentiation here), 93. Turn in:

1. Find f_x, f_y, f_z if $f(x, y, z) = yz \ln(xy)$
2. Determine if $u = e^{3x+4y} \sin 5z$ satisfies the three-dimensional Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$.
3. Show that $w = \ln(2x + 2ct)$ satisfies the wave equation $\frac{\partial^2 w}{\partial t^2} = c^2 \frac{\partial^2 w}{\partial x^2}$.

M. Recommended book problems: 14.4 / 1, 3, 5, 19, 21, 24, 33, 34. Nothing to turn in.

N. 14.5 / 2-6, 8, 9, 13, 14, 21, 23, 25, 35, 36, 37, 38, 41. Turn in:

1. The temperature at a point (x, y) is $T(x, y) = 20 + 0.1(x^2 - xy)$ degrees Celsius. A particle moves clockwise (not the usual counterclockwise!) along the unit circle with an angular speed of 1 radian per second. How fast is the particle's temperature changing at time $t = 2\pi$?