

Homework for Sections 12.3–12.5

Mathematics 114, Section 2

due Monday, October 28

Read Sections 12.3–12.5 of the textbook.

1. **Section 12.3:** 4, 11, 12, 21, 26, 32, 48, 58, 64, 68
2. **Section 12.4:** 3, 4, 9, 12, 22, 26
3. **Section 12.5:** 2, 9, 14, 42, 47
4. Give an example of a function $f(x, y)$ and a point (x_0, y_0) such that

$$\lim_{(h,k) \rightarrow (0,0)} \frac{f(x_0 + h, y_0 + k) - f(x_0, y_0)}{\sqrt{h^2 + k^2}}$$

does not exist. (There are lots of possibilities; just pick a simple formula for f and particular numbers for x_0 and y_0 , and show carefully that the limit does not exist.)

5. Using the formulas from Section 12.5, problem 42, derive a formula for the Laplace equation (pg. 932) in polar coordinates. In other words, rewrite the equation

$$f_{xx} + f_{yy} = 0$$

in terms of partial derivatives with respect to r and θ .

Make sure you can do the core problems.

(12.3 — 5,19,30,47,57,63,65; 12.4 — 5,11,20,23,24,34a; 12.5 — 3,8,17,40,41).