MATH 112A Review: Laplace and Polar Coordinates

Facts to Know:

Check out the Prerequisite Materials for Math 2E on partial derivatives (video 3):

https://www.math.uci.edu/~prerequisite-videos/2e.html

(2 D) Let $f : \mathbb{R}^2 \rightarrow \mathbb{R}$. The Laplace operator is

$$\Delta f =$$

(polar coordinates) Let $x = r \cos \theta$ and $y = r \sin \theta$. Let $g(r, \theta) = f(r \cos \theta, r \sin \theta)$. Then,

$$\Delta f(x, y)\big|_{(r \cos \theta, r \sin \theta)} =$$

(3 D) Let $f : \mathbb{R}^3 \rightarrow \mathbb{R}$. The Laplace operator is

$$\Delta f =$$

Examples:

1. Let $f(x, y) = xy^2$. What is $\Delta f$?

2. Let $f(x, y) = \sqrt{x^2 + y^2}$. What is $\Delta f$ in polar coordinates?