Assignment 1 Solutions

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Due on Friday, September 22nd, 2017

Question 1: Find and sketch the domain of:
a)

$$f(x, y) = \frac{ln(2x + 3y)}{\sqrt{1 - x^2 - y^2}}$$

Let $g(x, y) = ln(2x + 3y)$, and let $h(x, y) = \sqrt{1 - x^2 - y^2}$.
Since $g(x, y)$ is a logarithmic function,

$$2x + 3y > 0 \rightarrow y > \frac{-2x}{3}$$

Since $h(x, y)$ is the denominator of $f(x, y)$, impose the restriction that $h(x, y) \neq 0$. Since $h(x, y)$ is a square root function,

$$1 - x^2 - y^2 > 0 \rightarrow x^2 + y^2 < 1$$

. Since $f(x, y) = \frac{g(x,y)}{h(x,y)}$, the domain satisfying $f(x, y)$ is the union of the domains of $g(x, y)$ and $h(x, y)$, along with $h(x, y) \neq 0$,

$$D(f(x, y)) = \{(x, y)|2x + 3y > 0\} \cap \{(x, y)|x^2 + y^2 < 1\}$$

Since it was required that I sketch the domain, please see the following attached page for my sketch.