

Homework Assignment for Week 16

1. Section 16.4: Problems 10, 17, 19, 23, 27, 29, 38, 39.
2. Let $\mathbf{F} = \frac{x}{\sqrt{x^2+y^2}}\mathbf{i} + \frac{y}{\sqrt{x^2+y^2}}\mathbf{j} + 0\mathbf{k}$ and $\mathbf{G} = \frac{-y}{x^2+y^2}\mathbf{i} + \frac{x}{x^2+y^2}\mathbf{j} + 0\mathbf{k}$.
 - (a) Show that both \mathbf{F} and \mathbf{G} satisfy the component test.
 - (b) The natural domain for both \mathbf{F} and \mathbf{G} is $\{(x, y, z), x^2 + y^2 \neq 0\}$ (that is where \mathbf{F} and \mathbf{G} are defined). Show that \mathbf{F} is conservative in this domain by finding its potential function.
 - (c) Show that \mathbf{G} is NOT conservative in this domain (see example 5 on p945).
 - (d) If given another \mathbf{H} satisfying the component test in this domain, how do you determine whether \mathbf{H} is conservative?