MATH 282 SPRING 2022
HOMEWORK 7
DUE MAY 18, 2022.

INSTRUCTOR: ROBERT LIPSHITZ

Required problems (quiz problems drawn from these):

- Section 16.5: 5, 12, 15, 17, 19, 25, 31.
- Section 16.6: 8, 10, 13–18, 21, 23, 33, 49.

Suggested challenge problems (conceptually interesting problems in the text to think about, but which will not be on a quiz):

- Section 16.5: 32–39. (Lots of somewhat interesting stuff here.)
- Section 16.6: 60, 64.

Practice matrix:

If you got help with these...	try these on your own for more practice.
16.5.5	16.5.1–8
16.5.12	Office hours
16.5.15, 17	13, 14, 16, 18
16.5.19	16.5.20
16.5.25	16.5.23–29
16.5.31	16.5.30, 32
16.6.8	16.6.3–12
16.6.13–18	16.6.3–12, office hours
16.6.21, 23	16.6.19–26, 27–32
16.6.33	16.6.34–38
16.6.49	16.6.39–50

Comments on some of these problems:

- 16.5.15, 17: The webworks problem bank doesn't have many like this, so be sure to do enough from the book to get the feel for finding the potential functions.
- 16.5.19: Such a vector field $\vec{G}$ would be called a *vector potential*.
- 16.5.25: These are all versions of familiar 1-variable facts; in this case, the product rule. In practice, instead of remembering all of these one thinks, "there should be some kind of product rule for $\nabla \cdot (f\vec{F})$" and then figures out what form that has to take.
- 16.5.33, 34: These are basically integration-by-parts formulas for the Laplacian, and do get used sometimes. (They're also used in 16.5.35 and 16.5.36.)
- 16.5.36: For some reason, the book doesn't point out that this implies that $\nabla f = 0$ everywhere so f is constant, hence equal to 0 everywhere. This is an important uniqueness result for solutions to the Laplace equation.

Email address: lipshitz@uoregon.edu