Topics in Mathematical Physics (PHYS 320): QPS 4 Spring 2019

Welcome to the problem set on PDEs!

- Please submit your solutions before the last math methods class day - May 9.
- Please use your notes Mathematica, Wolfram Alpha, Schaum's, and Boas, but no other resources. If you use software then include printouts of your work using the program(s).
- You may not consult any other resources such as one might find on the internet.
- Your solutions must be entirely your own work.
- Please check your results.

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(1) (20 pts.) Bucking the current trend in drum construction, you build a rectangular drum with side lengths 13π cm (the width in the x direction) and 42 cm (the length in the y direction). The surface has a wave speed ("phase velocity") of $v = 52$ ms^{-1}.
   (a) Find a general solution for the modes on the drum described by the function $z(x, y, t)$.
   (b) Find the drum's four lowest frequencies.
   (c) Sketch the nodal patterns that go with each frequency.

(2) (20 pts.) Boas pg 651 problem 15

(3) (15 pts.) Boas pg 613 problem 20 - Associated Laguerre functions!