

MATH 561
Homework 1
Due Monday Sept. 17

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“You must learn by doing the thing— for though you think you know it you have no certainty until you try.”

Sophocles

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page 5: Problem 4.

page 9: Problems 1, 3, and 8.

page 18: Problems 2 (good problem) and 5 (this combines the simple transport equation we derived in the lecture with the diffusion equation).

page 24: Problem 5 (this sort of boundary condition arises frequently in quantum mechanics too).

page 27: Problems 1 and 4.

10. In the lecture we derived the equation satisfied by the concentration $u(x, t)$ of some dissolved chemical transported by a thin tube of fluid travelling with uniform speed c . Derive the equation satisfied by the concentration $u(x, y, t)$ of a chemical transported by a fluid flowing in the plane with a known, time-independent, velocity $v(x, y)$.