

**Homework Set #1**Assignment #1:

Open up your favorite web browser and go to <http://web.mit.edu/fluids/www/Shapiro/ncfmf.html> Watch the 30-minute video titled "Flow Visualization" and answer the following questions:

- a) Define the following terms used in the video:
  - i. a pathline
  - ii. a streamline
  - iii. a streakline.
- b) Name three different techniques used for flow visualization in the video.

Assignment #2:

(Adapted from R. M. Olson and S. J. Wright, *Essentials of Engineering Fluid Mechanics*, 5<sup>th</sup> edition, Harper & Row, New York, 1990)

Determine if the following velocity fields describe an incompressible fluid flow. Clearly show your logic.

- a)  $V_x = x^2 \cos(y)$ ,  $V_y = -2x \sin(y)$
- b)  $V_x = x + 2$ ,  $V_y = 1 - y$
- c)  $V_x = x y t$ ,  $V_y = x^3 - \frac{y^2 t}{2}$
- d)  $V_x = \ln(x) + y$ ,  $V_y = x y - \frac{y}{x}$
- e)  $V_x = x + y$ ,  $V_y = x - y$