Physics 370   **Homework 1**   **Due Wednesday, January 24, 2018**

Reading assignment: Griffiths pages 1-24, and the 5 page "Advertisement" just before Chapter 1.

<u>Problem 1</u> Compute the dot product and the cross product of the constant vectors:

$$\vec{A} = 2\hat{x} - 7\hat{y} + 3\hat{z}$$
$$\vec{B} = 4\hat{x} + \hat{y} - 2\hat{z}$$

What is the angle between the vectors $\vec{A}$ and $\vec{B}$?

<u>Problem 2</u> Find the gradients of the functions:
(a) $f(x, y, z) = xy^3z$
(b) $f(x, y, z) = \sqrt{x^2 + y^2 + z^2}$
(c) $f(x, y, z) = e^z \cos(y)$

<u>Problem 3</u> Find the divergence and the curl of the vector function:

$$\vec{B}(x, y, z) = (x^2 + yz)\hat{x} + (y^2 + zx)\hat{y} + (z^2 + xy)\hat{z}$$

<u>Problem 4</u> Prove by explicit calculation that the divergence of the curl of *every* vector field $\vec{A}(x, y, z)$ is always zero.

<u>Problem 5</u> Find the Laplacian of each of the functions in Problem 2.