CS4815 **Week02 Tutorial**

1. Go to Wikipedia `http://en.wikipedia.org/` and read the pages on Colour Spaces (`http://en.wikipedia.org/wiki/Colour_spaces`), Optical Illusions (`http://en.wikipedia.org/wiki/Optical_illusion`) and M. C. Escher (`http://en.wikipedia.org/wiki/M._C._Escher`)

2. Buy book (*Hearn, Baker and Carithers*) and read all of Chapters 1 and begin reading Chapter 2

Look over the vector review material ("Vector Review I" in Resource Matrix, `http://garryowen.csisdmz.ul.ie/~cs4815/resources/oth1.pdf`) and `http://www.coranac.com/tonc/text/matrix.htm`. Use this information to solve the following problems.

1. Show that the normal to the line $ax + by + c = 0$ is the vector $u = (a, b)^T$.

2. Use vector methods to find

   - the equation of the line through $p = (2, 3)$ and perpendicular to the line $x + 2y + 5 = 0$
   - the equation of the line through $p_1 = (2, 3)$ and $p_2 = (5, -1)$
   - use vector methods to find the distance of the point $p = (2, 3)$ from the line $3x + 4y - 12 = 0$

3. Resolve a vector $\mathbf{a}$ into two components $\mathbf{a_1}$ and $\mathbf{a_2}$ that are, respectively, parallel and perpendicular to another vector $\mathbf{b}$. That is, find vectors $\mathbf{a_1}$ and $\mathbf{a_2}$ so that

   - $\mathbf{a_1} = c\mathbf{b}$, where c is a scalar (number)
   - $\mathbf{a_2} \cdot \mathbf{b} = 0$

   It will be of particular interest to us to know what happens if $\mathbf{b}$ happens to be one of the basis vectors of some co-ordinate system. So what is the formula for $\mathbf{a_1}, \mathbf{a_2}$ when $\mathbf{b}$ has length 1?