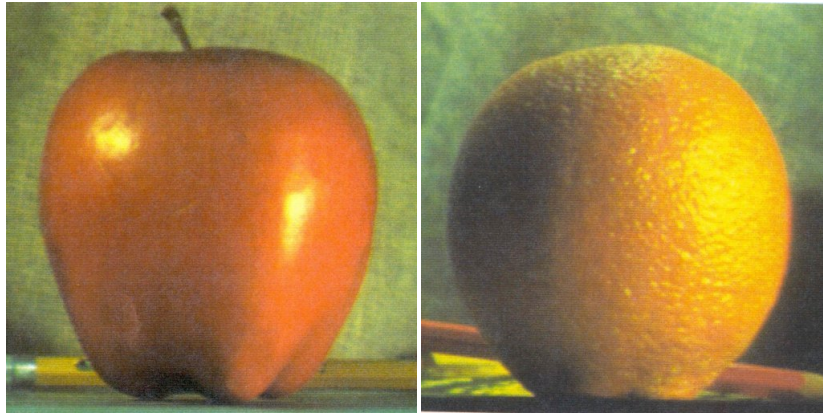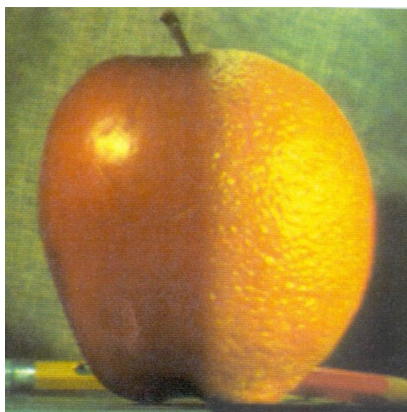# Laplacian Blending: Reduce and Expand operations

For this lab, you will implement the Laplacian pyramid algorithm for blending. You will follow the main steps described in the videos for this week, and we will use the iconic example from the paper of Burt and Adelson. Below, you can take a look at the two images we want to blend.

If we crop the left part from one image and the right part from the other and attempt to merge them, we will get a mediocre result:
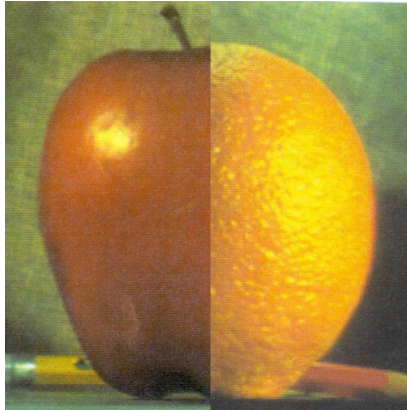
In this lab, we will attempt a multi-scale blending practice based on Laplacian pyramids, that will give more realistic outputs, like the one below:

All the relevant material for this lab can be found in the zip file Lab3.zip (http://courses.edx.org/asset-v1:PennX+ROBO2x+2T2017+type@asset+block@Lab3.zip). In the first part, you will write the code for the basic building blocks used by the Gaussian and Laplacian pyramid, the **reduce** and **expand** operations.

For the **reduce** function, first you will need to filter the image with a Gaussian kernel of size 5×5 and then subsample the image by a factor of 2.

For the **expand** function, you will first create an image that has twice the size of the original image and fill every second row and column of this new image with the rows and columns of the original image. Then filter the new image with the same Gaussian kernel as before.