

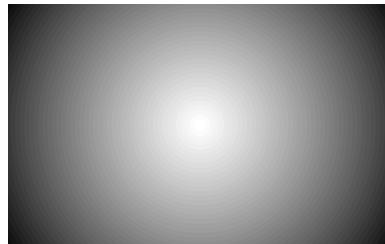
**Instructions:**

Be sure to save any attached files (.jpg or .png files called within your function) in the same folder as your code, in a separate folder named **data**. All parts of lab questions that have **R** at the beginning are mandatory, and their submission by each student is required. The parts of each question that begin with **O** are open-ended enhancements for further investigation into course material. These should be completed only after the mandatory parts of the lab are completed, and are not explicitly required for submission. If you choose to complete further optional add-ons, you are welcome to explore your own options, and not just the suggestions provided. Submit a zip document to the dropbox folder L8 on LEARN. The document should contain separate folders for the following files:

- **L8\_Vignette**
  - **L8\_Sepia**
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**1. Vignette**

- R** Download the file flowers.jpg, and place in the data folder within your code's folder. Create a program that adds a vignette (like the image below) to the photo. Do this by multiplying each pixel's red, green and blue values by the same variable, which changes depending on a pixel's distance from the center of the image.



- First load flowers.jpg, and then load the pixels of that image (recall CS 105)
- Loop through every pixel of the image and change the colour of the pixel by:
  - (a) Calculating the pixel's distance from the center of the image (call this  $d$ )
  - (b) Updating the red, green and blue values to depend on the pixel's value of  $d$  (Note that you should not just multiply the pixel's colour by  $d$ , or you will end up with a picture that is mainly white)

## 2. Sepia

- a. **R** Download the file `barn.jpg`, and place in the data folder within your code's folder. Write a sketch that converts images from full colour to sepia tones, by changing the red, green, and blue values of each pixel.

- First load `barn.jpg`, and then load the pixels of that image (recall CS 105)
- Loop through every pixel of the image and change the colour of the pixel
- Each pixel's new red value depends on the pixel's old *red and green* values
- Each pixel's new green value depends on the pixel's old *green and red* values
- Each pixel's new blue value depends on all the previous *blue, green and red* values of the corresponding pixel.

Everyone's solution to this question will be slightly different, as there are different intensities of sepia (for example, some sepias are more red-toned than others).