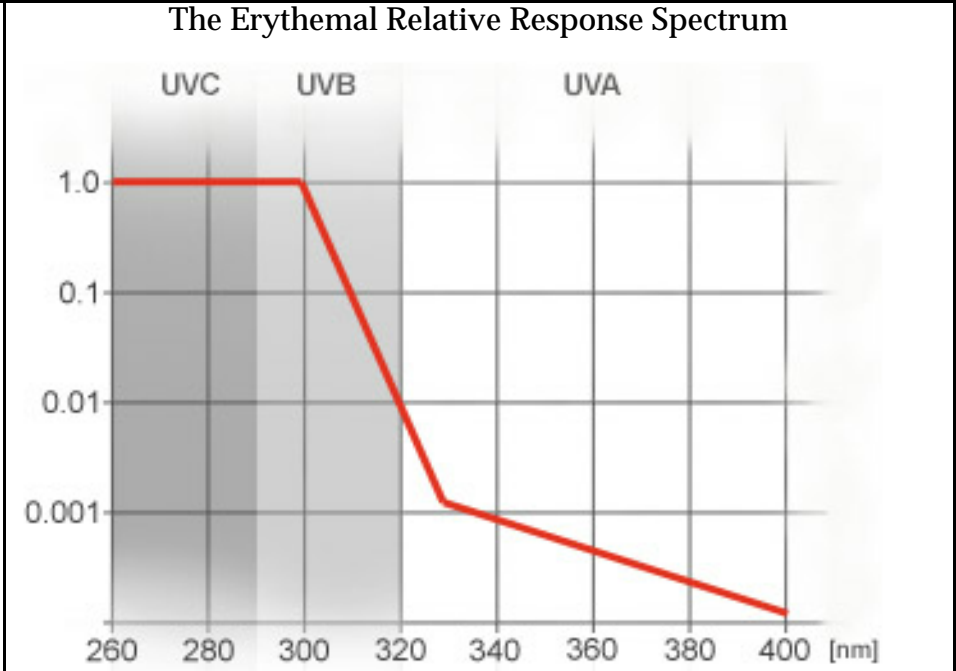


**The problem of measuring "skin burning intensity" of sun light**

Human skin is not equally sensitive to all types of ultraviolet(UV) radiation. The Erythmal Response Spectrum is a scientific expression that describes human skin sensitivity to UV.

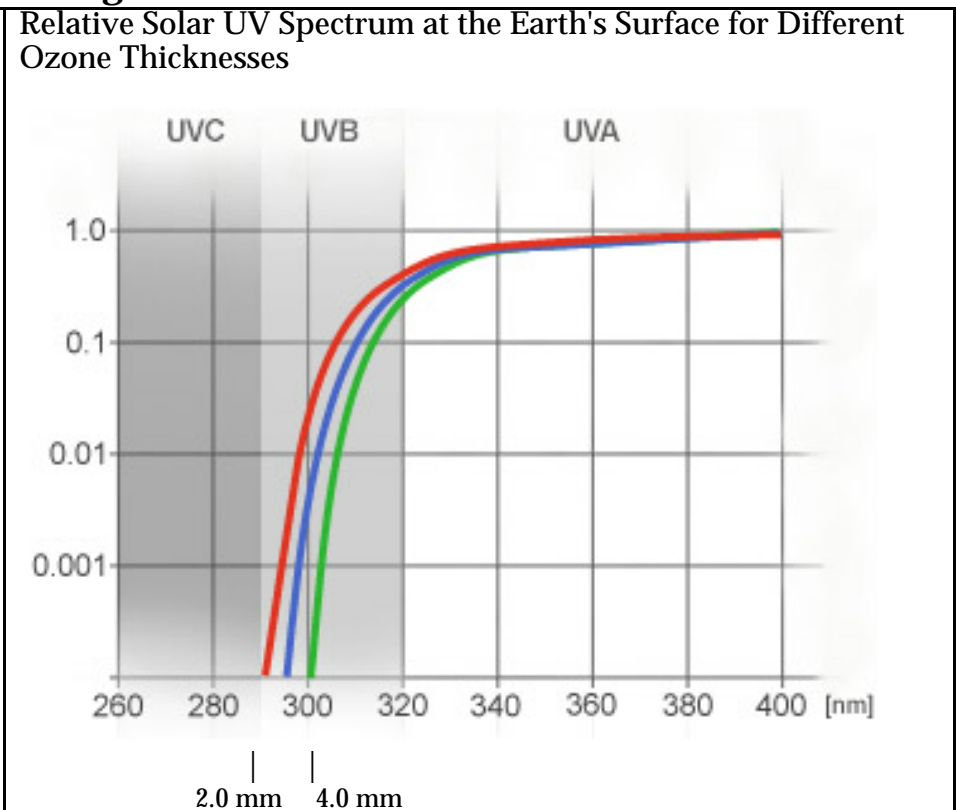
**Skin sensitivity to Ultraviolet Radiation - the Erythmal Response Spectrum**

Exposing skin to UV light leads to redness or burning once a threshold dose has been exceeded. However, sunburn is not simply proportional to the total absorbed energy of ultraviolet light. Skin sensitivity to Erythema depends strongly on the UV wavelength. Although overall sensitivity to sunburning varies among individuals, the relative sensitivities to separate wavelengths remain the same. The Erythmal Response Spectrum (shown on the graph) demonstrates erythmal skin sensitivity for UV wavelengths.



**UV Radiation contained in Solar Light at the Earth's Surface**

The intensity of UV radiation reaching the Earth's surface is not uniform in UV wavelength components. Due to ozone absorption, UV rays with wavelengths shorter than 290nm (often classified as the UV-C range) are of negligible intensity. For the intermediate UV-B range (290-320nm) the ozone absorption is substantial, but UV radiation still reaches the Earth's surface. The UV-A range (320-400nm) is little absorbed by the Earth's ozone layer. The graph shows the relative Solar UV Spectrum for three ozone thicknesses: 2.0 mm, 2.6 mm, and 4.0 mm. Data for noon time, clear sky, latitude 40°, equinox, at the Earth's surface. The curves are normalized to 1 at 400nm.



**The Effective UV Spectrum - The "Skin Burning Intensity"**

The Effective UV Spectrum is the mathematical product of Solar UV Spectrum and the Erythmal Response Spectrum. It can be interpreted as the "skin burning intensity" of individual wavelengths of sunlight.

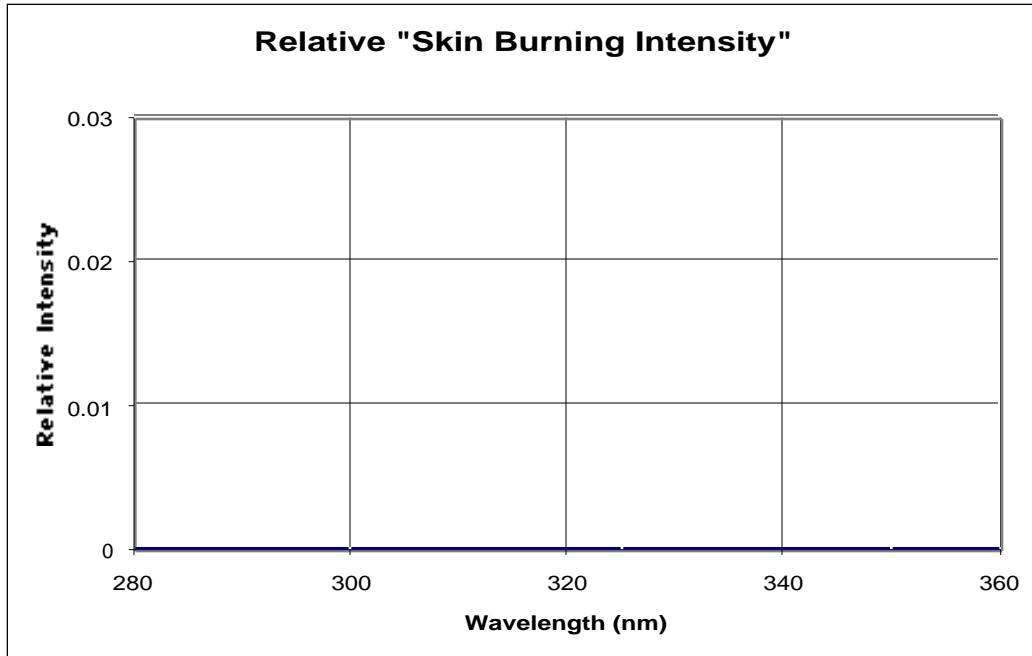
Name \_\_\_\_\_ Reci. Section time: \_\_\_\_\_

**Please do your own work. Open book and notes. Please do not talk to your neighbors.**

You may earn up to 15 points based on your explanations.

Based on the information contained on "The problem of measuring "skin burning intensity" of sun light" page answer the following questions:

1. Determine the relative "Skin Burning Intensity" as a function of UV wavelength for the ozone thicknesses of 2.0 mm and 4.0 mm. Label each curve by ozone thickness.



2. Discuss the relationship between ozone thickness and skin burning.

3. Explain how these data can be related to the experiments you did in Physics 142 laboratory this week.