NAME: _____	Quiz #4a: Phys270

1. [10 pts] A 0.50-mm-thick piece of glass is inserted into one arm of a Michelson interferometer that is using light of wavelength 600nm. This causes the fringe pattern to shift by 500 fringes. What is the index of refraction of the piece of glass?

NAME: _____	Quiz #4b: Phys270

1. [10 pts] In a double-slit experiment, the slit separation is 100 times the wavelength of light. What is the angular separation between the central maximum and the adjacent bright fringe? Note that for small angles, $Sin(\theta) \approx \vartheta$ for $\vartheta << 1$.

NAME: _____	Quiz #4c: Phys270

1. [10 pts] White light (400 to 700 nm) incident on a 1000 line/mm diffraction grating produces rainbows of diffracted light. What is the width of the first-order rainbow when measured with a ruler on a screen 10 m behind the grating? Assume $Sin(\theta) \approx \vartheta$ for $\vartheta << 1$.

NAME: _____	Quiz #4d: Phys270

1. [10 pts] A radar station for tracking aircraft broadcasts a 12 GHz microwave beam from a 2.44-m-diameter circular radar antenna. From a wave perspective, the antenna is a circular aperture through which the microwaves diffract. What is the diameter of the radar beam at a distance of 40 km?

   Note that the speed of light is $c=3.0 \times 10^{8}$ m/s and 1 GHz = 10^{9} Hz.

   Hint: derive the equation first and plug the numbers in at the last step to make the numerical calculation easy!