

Directions: Please be sure to follow the directions as listed in the syllabus for the problem of the week to receive credit.

(Due: October 2) The declination of the sun is defined to be the signed angle between the sun's rays and the plane of the equator (More precisely, if \mathbf{s} and \mathbf{n} denote the vectors from the center of the earth to the sun and north pole, respectively, then the declination of the sun, α , is given by $\alpha = \pi/2 - \beta$, where β is the angle between \mathbf{s} and \mathbf{n}). Express the number of hours between sunrise and sunset at a latitude of ϕ in terms of α and ϕ , where a negative latitude indicates a location south of the equator.