

# Math 1613 - Trigonometry

## Written Assignment 8 - Due 2019.07.28

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Directions: Please answer the following question in complete sentences. Be sure to label all geometric objects in any illustrations (if any). I will accept an answer in a scanned image format, as a pdf, or as a picture taken and sent from your awesome smart phone.

Question: The space velocity  $\vec{v}$  of a star relative to the sun can be expressed as the resultant vector of two perpendicular vectors – the radial velocity  $\vec{v}_r$ , and the tangential velocity  $\vec{v}_t$ , where  $\vec{v} = \vec{v}_r + \vec{v}_t$ . If a star is located near the sun and its space velocity is large, then its motion across the sky will also be large. Barnard's Star is a relatively close star with a distance of 35 trillion miles from the sun. It moves across the sky through an angle of  $10.34''$  per year, which is the largest motion of any known star. Its radial velocity is  $\vec{v}_r = 67$  miles per second toward the sun.

- (a) Approximate the tangential velocity  $\vec{v}_t$  of Barnard's Star. (*Hint: Use the arc length formula  $s = r\theta$* ).
- (b) Compute the magnitude of  $\vec{v}$ .

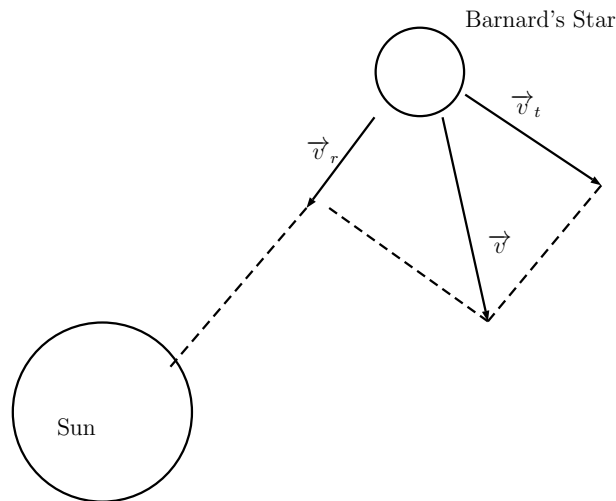


FIGURE 1. Awesome pic of the scenario for this week's problem.