

Calculus III
Homework # 1

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Chapter 1

Lab 2 - 13.1 Apps

1.1 Work

Question 1

Let $\vec{T}_1$ represent the tension of the leftmost cable, while $\vec{T}_2$ encodes the tension force experienced by the rightmost cable. Our coordinate system will originate at the intersection of the two cables.

$$\vec{T}_1 := \langle \|\vec{T}_1\|; 135^\circ \rangle$$

$$\vec{T}_2 := \langle \|\vec{T}_2\|; 15^\circ \rangle$$

$$500 = \|\vec{T}_1\| \sin 135^\circ + \|\vec{T}_2\| \sin 15^\circ$$

$$0 = \|\vec{T}_1\| \cos 135^\circ + \|\vec{T}_2\| \cos 15^\circ$$

$$\Rightarrow 500 = \|\vec{T}_1\| \frac{\sqrt{2}}{2} + \|\vec{T}_2\| \cdot 0.258819045103$$

$$\Rightarrow 0 = \|\vec{T}_1\| \frac{-\sqrt{2}}{2} + \|\vec{T}_2\| \cdot 0.965925826289$$

Solving the system numerically yields:

$$\|\vec{T}_1\| \Rightarrow 557.677 \text{ lb}$$

$$\|\vec{T}_2\| \Rightarrow 408.248 \text{ lb}$$

This corresponds to answer choice A

Question 2