We are given the following information:

$$|\vec{T}| = 1500N \tag{1}$$
$$|\vec{r}| = 80m \tag{2}$$
$$\theta = 16.7° \tag{3}$$

1 | Magnitude of Torque

The magnitude of the torque is given by the length of the lever arm multiplied by the magnitude of force, that is:

$$||\vec{r}||\vec{T}|sin(\theta)| \tag{4}$$

Therefore:

$$|1500 \cdot 80 \cdot 0.28736| = 34483.2 \approx |\vec{\tau}| \tag{5}$$

2 | Length of the Lever arm

Based on the expression for the magnitude of the torque, we can see that $||\vec{r}|sin(\theta)|$ is the "length" of the lever arm were $\vec{T}$ be applied totally perpendicularly. Therefore, the length of the lever arm would be:

$$|80 \cdot 0.28736| = 22.99 \tag{6}$$

3 | Direction of Torque

As we deducted above, the system's torque is in the "positive" direction. Treating $\vec{r}$ as the positive direction as well, we can apply the right hand rule and recognize that the direction of torque is into the page.

4 | Value of θ_1

The value of θ_1 is the angle between the lever vector and the torque vector. In this case, $\theta_1 = 163.3°$. Though the outer angle between the two vectors is different (i.e. $180 - 163.3 = 16.7$), the value of sin between the two angles ($180 - \theta$ and θ) would be the same (i.e. that sin$(180 - \theta) =$ sin(θ)).