Homework Discussion, Week 8

Physics 1301   Dr. Andersen

Chapter 11

20.) The student is in static equilibrium. In this case all the forces act in the y direction only. a) The force equation for y is:

$$122 \ N + 290 \ N - mg = 0$$

Solving for m gives $m = 42 \ kg$. b) To find the distance to the center of mass, we need the torque equation. Taking the torque around the students head gives

$$(2.5 \ m)(122 \ N) - mgx = 0$$

where x is the distance from her head to her center of mass. Solving gives $x = 0.74 \ m$.

27.) We must apply the conditions of static equilibrium:

$$F_x + T_x + W_x = 0$$

$$F_y + T_y + W_y = 0,$$

and taking the torque to be around the position of the hinge:

$$\tau_T + \tau_W = 0.$$

In this problem, the angle between the tension and the $+x$ axis is 180°, so:

$$F_x + T \cos 180° + mg \cos 270° = 0$$

$$F_y + T \sin 180° + mg \sin 270° = 0$$

$$T(1.2 \ m) \sin 25° - mg \sin 65° = 0.$$

Solving these equations gives $F_x = 32 \ N$, $F_y = 30 \ N$, and $T = 32 \ N$.