

1.

$$(a) \text{ By symmetry } \bar{x} = \frac{\pi}{2}, \quad \bar{y} = \frac{\delta \int_0^{\pi} \frac{1}{2} \sin x \cdot \sin x \, dx}{\delta \int_0^{\pi} \sin x \, dx} = \frac{\frac{1}{2} \cdot \frac{\pi}{2}}{2} = \frac{\pi}{8}$$

$$(b) \quad V = 2\pi\bar{y} \cdot \text{Area} = 2\pi \cdot \frac{\pi}{8} \cdot 2 = \frac{\pi^2}{2}$$

2. $(700)(15) + \int_0^{15} 2y \, dy \approx 10,725$ ft-lbs or $(700)(15) + \int_0^{15} 2(15-y) \, dy$ ft-lbs . The integral depends on how your picture is labeled.

$$3. \quad \int_{-5}^5 2496\sqrt{25-y^2} (8-y) \, dy \approx 784,142 \text{ ft-lbs}$$