HW 9-6 Soln)

For the x-axis, the distance of each mass from the x-axis is its y-coordinate.

$$I\_{x}= \sum\_{n}^{}m\_{n}r\_{n}^{2}=\sum\_{n}^{}m\_{n}y\_{n}^{2}=3\left(4^{2}\right)+5\left(4^{2}\right)+3\left(2^{2}\right)+2\left(2^{2}\right)=148 kg m^{2}$$

For the y-axis, the distance of each mass from the y-axis is its x-coordinate.

$$I\_{x}= \sum\_{n}^{}m\_{n}r\_{n}^{2}=\sum\_{n}^{}m\_{n}x\_{n}^{2}=3\left(2^{2}\right)+5\left(2^{2}\right)+3\left(2^{2}\right)+2\left(2^{2}\right)=52 kg m^{2}$$

For the z-axis, the distance squared of each mass from the z-axis is (x2 + y2).

$$I\_{z}= \sum\_{n}^{}m\_{n}r\_{n}^{2}=\sum\_{n}^{}m\_{n}\left(x\_{n}^{2}+y\_{n}^{2}\right)=3\left(4^{2}+2^{2}\right)+5\left(4^{2}+2^{2}\right)+3\left(2^{2}+2^{2}\right)+2\left(2^{2}+2^{2}\right)=200 kg m^{2}$$

Note that the sum of the answers from a) and b) equals the answer from c).
This is consistent with the *perpendicular axis theorem*.