Math 163 **Rotating Bodies**

1. The axis of rotation of a rigid object is a line through the points $(2, 0, 1)$ and $(4, 2, 0)$. The object rotates counter-clockwise (when viewed from the point $(4, 2, 0)$ looking toward the point $(2, 0, 1)$) at the rate of 6 rev/sec.

a. Determine the velocity and speed of the point P on the object when it passes through the point $(3, -1, 5)$. Do this calculation twice, using two different position vectors in computing the appropriate cross-product.
b. The path traced by the point P is a circle. Determine the radius of this circle.
c. Which of the following could be velocity vectors for a point on the object? For those that can, give the coordinates of three points on the object that have the given velocity.

i. $< 4, -1, 1 >$
ii. $< 1, 1, 4 >$

2. A rigid object rotates about a fixed axis in space. At some instant the velocity of the point with coordinates $(2, 1, 4)$ on the object is $< 2, -1, -1 >$ and the velocity of the point with coordinates $(-1, 0, 3)$ is $< 1, 4, -2 >$. Determine the axis of rotation of the object and its angular velocity.

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