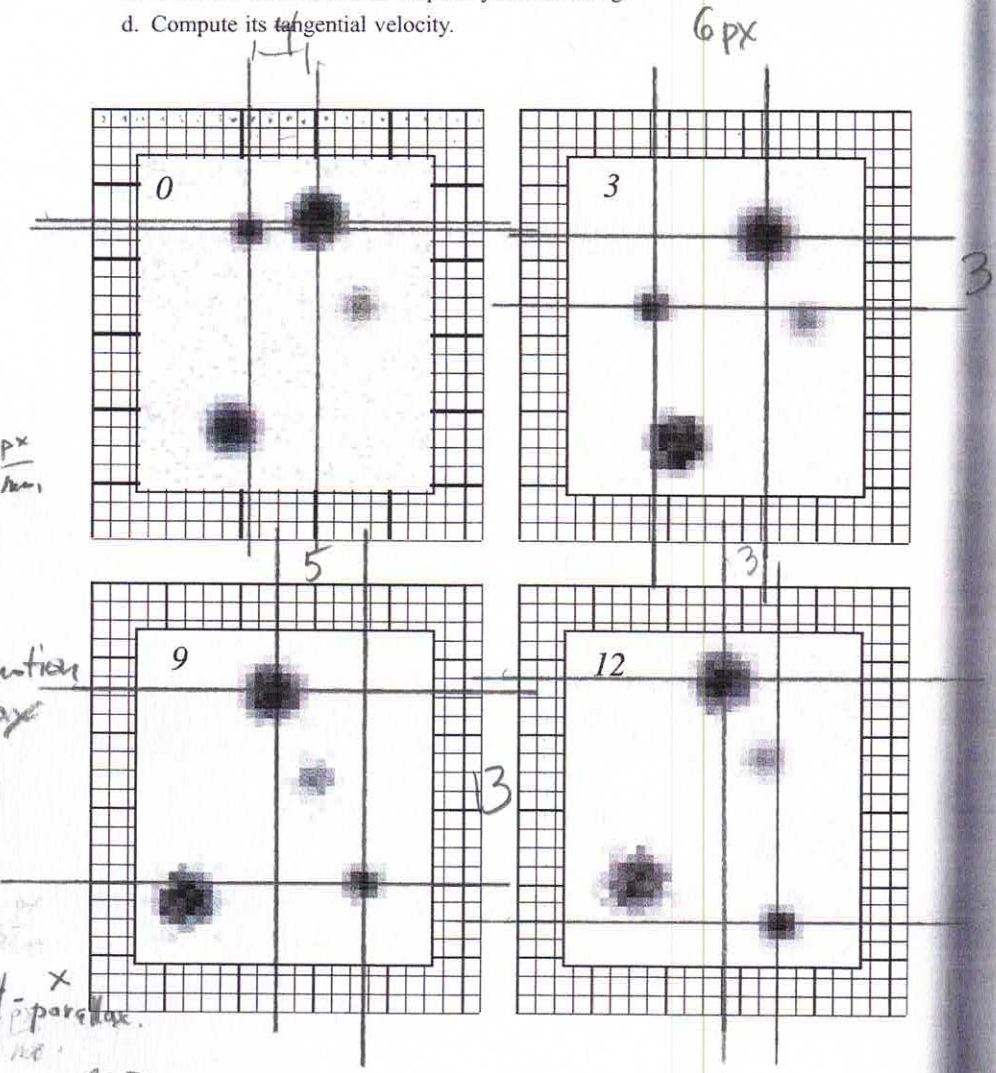
c. Is it a star or an asteroid? Explain your reasoning.

d. Compute its tangential velocity.



bet. 9 & 12 1/2 1

$\Delta x = 7$ px

$\Delta y = 12.5$ px

$\left(\frac{\Delta x}{\Delta t}\right)_{pm} = \frac{7\text{ px}}{12\text{ mo}} = 0.6\ \frac{\text{px}}{\text{mo}}$

$\left(\frac{\Delta y}{\Delta t}\right)_{pm} = 1\ \frac{\text{px}}{\text{mo}}$

bet. 3 & 9 – proper motion + parallax

10

$\Delta x = 11$ px

$\Delta y = 6.5$ px

$\Delta x_{p+pm} - \left(\frac{\Delta x}{\Delta t}\right)_{pm} \cdot \Delta t =$

$11\text{ px} - \left(0.6\frac{\text{px}}{\text{mo}}\right)(6\text{ mo}) = 7.4$ – parallax

$\Delta y_{p+pm} - \left(\frac{\Delta y}{\Delta t}\right)_{pm} \Delta t$

$6.5\text{ px} - \left(1\frac{\text{px}}{\text{mo}}\right)(6\text{ mo}) = 0.5\text{ px}$ – parallax

≈ 0

7.4 px → 1.8 arcsec.

$r = \frac{a}{p} = \frac{2\text{ AU}}{(1.8/206265)} = 239{,}000\text{ AU}$

13. Your spectrograph has a resolving power of 9000. You observe a star whose spectrum has 25 lines with well-determined rest wavelengths. What is the best precision, in km s^{-1}, that can you expect if you measure the radial velocity of this star on one spectrum?

14. An astronomer measures the radial velocities of 20 stars in a nearby star cluster, and finds they have an average radial velocity of 51 km s^{-1} with a standard deviation of the sample of 16 km s^{-1}. He also determines that the proper motions of the same stars average to 14.5 arcsec per century with a standard deviation of the sample of 6.0 arcsec per century. Compute the distance of the cluster and the magnitude of its space velocity. Compute the uncertainty of your answers.

Chapter 4
Names, ca

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