1. Where the length unit is not specified (in this solution), the unit meter should be understood.

   (a) The position vector, according to Eq. 4-1, is $\vec{r} = -5.0\,\hat{\imath} + 8.0\,\hat{\jmath}$ (in meters).

   (b) The magnitude is $|\vec{r}| = \sqrt{x^2 + y^2 + z^2} = 9.4$ m.

   (c) Many calculators have polar $\leftrightarrow$ rectangular conversion capabilities which make this computation more efficient than what is shown below. Noting that the vector lies in the xy plane, we are using Eq. 3-6:

   $$\tan^{-1}\left(\frac{8.0}{-5.0}\right) = -58^\circ \quad \text{or} \quad 122^\circ$$

   where we choose the latter possibility (122° measured counterclockwise from the $+x$ direction) since the signs of the components imply the vector is in the second quadrant.

   (d) In the interest of saving space, we omit the sketch. The vector is 32° counterclockwise from the $+y$ direction, where the $+y$ direction is assumed to be (as is standard) $+90^\circ$ counterclockwise from $+x$, and the $+z$ direction would therefore be "out of the paper."

   (e) The displacement is $\Delta\vec{r} = \vec{r}\,' - \vec{r}$ where $\vec{r}$ is given in part (a) and $\vec{r}\,' = 3.0\,\hat{\imath}$. Therefore, $\Delta\vec{r} = 8.0\,\hat{\imath} - 8.0\,\hat{\jmath}$ (in meters).

   (f) The magnitude of the displacement is $|\Delta\vec{r}| = \sqrt{8^2 + (-8)^2} = 11$ m.

   (g) The angle for the displacement, using Eq. 3-6, is found from

   $$\tan^{-1}\left(\frac{8.0}{-8.0}\right) = -45^\circ \quad \text{or} \quad 135^\circ$$

   where we choose the former possibility (-45°, which means 45° measured clockwise from $+x$, or 315° counterclockwise from $+x$) since the signs of the components imply the vector is in the fourth quadrant.