Task. Determine the magnitude and direction of the resultant of the following displacements:
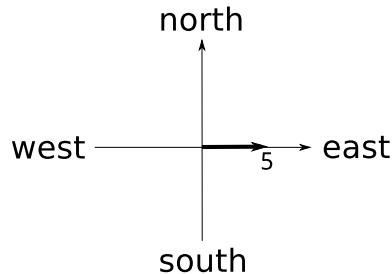a) 5m east,
b) 8m 45 degrees north of east,
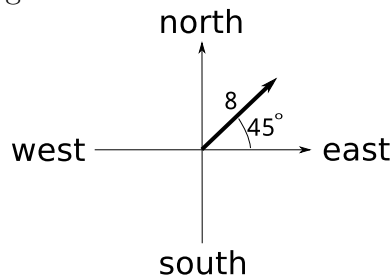c) 3m 60 degrees south of west,
d) 7m south.
Solution.
a) Consider the following figure:

The displacement 5m east is a displacement into the poisitive diretion of x-axis by 5 meters. Hence the displacement vector has coordinates $v = (5, 0)$. Its magnitude $|v| = \sqrt{5^2 + 0^2} = 5$ and its angle with x-axis is $0°$.
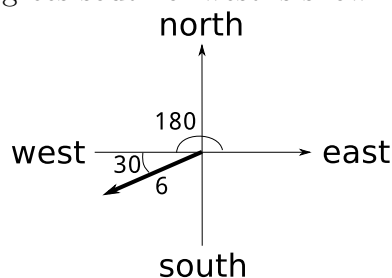
b) The displacement 8m 45 degrees north of east is shown in the following figure:

The displacement vector v has magnitude 8 and its angle with x-axis is equal to $45°$. Hence v has the following coordinates:

$$v = (8\cos 45°, 8\sin 45°) = \left(8 * \frac{1}{\sqrt{2}}, 8 * \frac{1}{\sqrt{2}}\right) = (4\sqrt{2}, 4\sqrt{2}).$$
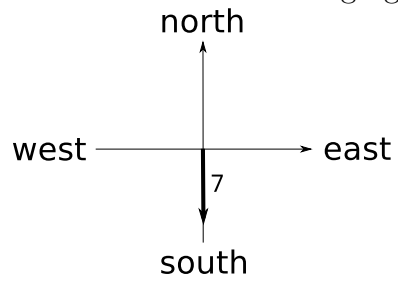
c) The displacement 3m 60 degrees south of west is shown in the following figure:

The displacement vector v has magnitude 6 and its angle with x-axis is equal to $180 + 30 = 210°$. Hence v has the following coordinates:

$$v = (6\cos 210°, 6\sin 210°) = (-6\cos 30°, -6\sin 30°) = \left(-6 * \frac{\sqrt{3}}{2}, -6 * \frac{1}{2}\right) \left(-3\sqrt{3}, -3\right).$$

d) The displacement 7m south is shown in the following figure:

north

west — east

7

south

The displacement vector v has magnitude 7 and it is directed down along y-axis. Hence v has the following coordinates:

$$v = (0, -7).$$