

11.4

$$\begin{aligned}
1) \quad \|\overrightarrow{AB}\| &= \left\| \begin{pmatrix} 5-2 \\ 5-1 \end{pmatrix} \right\| = \left\| \begin{pmatrix} 3 \\ 4 \end{pmatrix} \right\| = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5 \\
\|\overrightarrow{AC}\| &= \left\| \begin{pmatrix} 0-2 \\ -7-1 \end{pmatrix} \right\| = \left\| \begin{pmatrix} -2 \\ -8 \end{pmatrix} \right\| = \left\| -2 \begin{pmatrix} 1 \\ 4 \end{pmatrix} \right\| = |-2| \left\| \begin{pmatrix} 1 \\ 4 \end{pmatrix} \right\| = \\
&= 2\sqrt{1^2 + 4^2} = 2\sqrt{1 + 16} = 2\sqrt{17} \\
\|\overrightarrow{BC}\| &= \left\| \begin{pmatrix} 0-5 \\ -7-5 \end{pmatrix} \right\| = \left\| \begin{pmatrix} -5 \\ -12 \end{pmatrix} \right\| = \sqrt{(-5)^2 + (-12)^2} = \sqrt{25 + 144} = \\
&= \sqrt{169} = 13
\end{aligned}$$

Le périmètre du triangle ABC vaut donc $5 + 2\sqrt{17} + 13 = 18 + 2\sqrt{17}$.

$$\begin{aligned}
2) \quad \|\overrightarrow{AB}\| &= \left\| \begin{pmatrix} 4-2 \\ 3-1 \\ 4-3 \end{pmatrix} \right\| = \left\| \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix} \right\| = \sqrt{2^2 + 2^2 + 1^2} = \sqrt{9} = 3 \\
\|\overrightarrow{AC}\| &= \left\| \begin{pmatrix} 2-2 \\ 6-1 \\ -9-3 \end{pmatrix} \right\| = \left\| \begin{pmatrix} 0 \\ 5 \\ -12 \end{pmatrix} \right\| = \sqrt{0^2 + 5^2 + (-12)^2} = \\
&= \sqrt{0 + 25 + 144} = \sqrt{169} = 13 \\
\|\overrightarrow{BC}\| &= \left\| \begin{pmatrix} 2-4 \\ 6-3 \\ -9-4 \end{pmatrix} \right\| = \left\| \begin{pmatrix} -2 \\ 3 \\ -13 \end{pmatrix} \right\| = \sqrt{(-2)^2 + 3^2 + (-13)^2} = \\
&= \sqrt{4 + 9 + 169} = \sqrt{182}
\end{aligned}$$

Ainsi le périmètre du triangle ABC est $3 + 13 + \sqrt{182} = 16 + \sqrt{182}$.