

MATH-253: HW1

Due on 1/22/2024

Prof. Oleksandr Bobrovnikov (Sasha), Spring 2024, 1/22/2024

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2.1

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$$\begin{aligned} \text{a) } \overrightarrow{RP} &= \langle -1 - (-3), 3 - 7 \rangle = \underline{\langle 2, -4 \rangle} \\ \text{b) } \overrightarrow{PQ} &= \underline{2\vec{i} - 4\vec{j}} \end{aligned}$$

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$$\text{a) } \overrightarrow{PQ} = \langle 2, 2 \rangle, \overrightarrow{PR} = -\overrightarrow{RP} = \langle -2, 4 \rangle.$$

Therefore:

$$\begin{aligned} 2\overrightarrow{PQ} - 2\overrightarrow{PR} &= 2 \cdot \langle 2, 2 \rangle - 2 \cdot \langle -2, 4 \rangle \\ &= \langle 4, 4 \rangle - \langle -4, 8 \rangle \\ &= \underline{\langle 8, -4 \rangle} \end{aligned}$$

b)

$$\underline{8\vec{i} - 4\vec{j}}$$

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$$\|\overrightarrow{PQ}\| = \sqrt{2^2 + 2^2} = \sqrt{8} = 2\sqrt{2}$$

$$\text{a) } \underline{\langle 1, 1 \rangle}$$

$$\text{b) } \underline{\vec{i} + \vec{j}}$$

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$$\vec{v} = \langle 2 - (-1), 1 - (-3) \rangle = \langle 3, 4 \rangle$$

$$\|\langle v \rangle\| = \sqrt{3^2 + 4^2} = \sqrt{9 + 16} = \sqrt{25} = 5$$

$$\underline{\left\langle \frac{3}{5}, \frac{4}{5} \right\rangle}$$

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$$\vec{v} = \langle x - 1, 0 - 1 \rangle = \langle x - 1, -1 \rangle$$

$$\|\vec{v}\| = \sqrt{10} = \sqrt{(x - 1)^2 + (-1)^2} = \sqrt{x^2 - 2x + 2}$$

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