Angles between vectors using a non-standard inner product
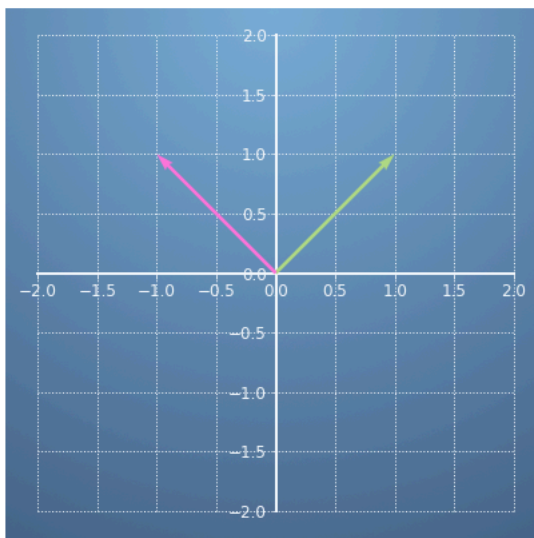
LATEST SUBMISSION GRADE

100%

Compute the angle between $\mathbf{x} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$ using the inner product defined by

$$\langle \mathbf{x}, \mathbf{y} \rangle = \mathbf{x}^T \begin{bmatrix} 2 & -1 \\ -1 & 4 \end{bmatrix} \mathbf{y}$$

- ○ 0.35 rad $(20°)$
- ○ 1.57 rad $(90°)$
- ⦿ 1.2 rad $(69°)$

✓ **Correct**
Absolutely right!

Compute the angle between $\mathbf{x} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ using the inner product defined by
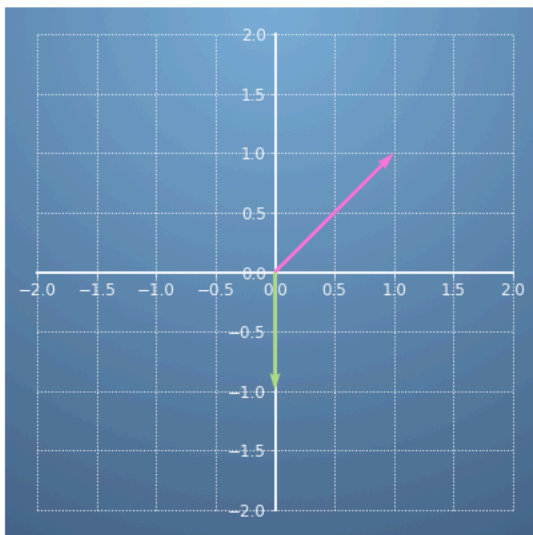
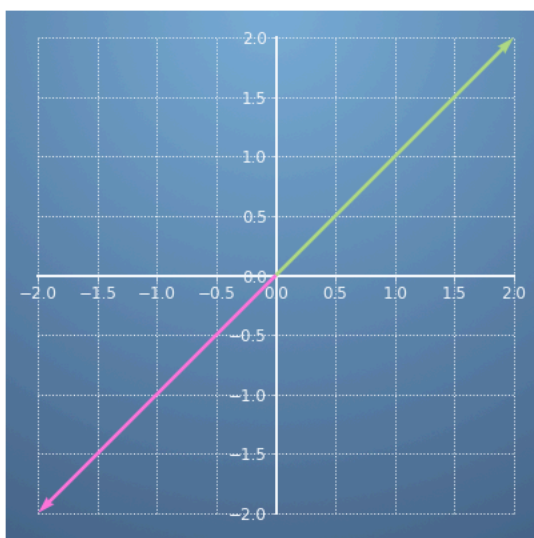$$\langle \mathbf{x}, \mathbf{y} \rangle = \mathbf{x}^T \begin{bmatrix} 1 & -\frac{1}{2} \\ -\frac{1}{2} & 5 \end{bmatrix} \mathbf{y}$$

- ● 2.69 rad $(154°)$
- ○ -0.9 rad $(-52°)$
- ○ 2.35 rad $(135°)$

✓ **Correct**
Well done!

Compute the angle between $\mathbf{x} = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} -2 \\ -2 \end{bmatrix}$ using the inner product defined by

$$\langle \mathbf{x}, \mathbf{y} \rangle = \mathbf{x}^T \begin{bmatrix} 2 & 1 \\ 1 & 4 \end{bmatrix} \mathbf{y}$$
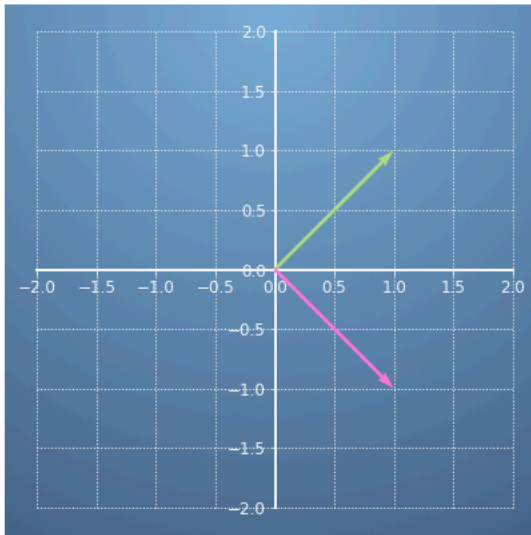
○ 0 rad $(0°)$

◉ 3.14 rad $(180°)$

✓ **Correct**
  Well done: $\pi \approx 3.14$ is the right answer.

Compute the angle between $\mathbf{x} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ using the inner product defined by

$$\langle \mathbf{x}, \mathbf{y} \rangle = \mathbf{x}^T \begin{bmatrix} 1 & 0 \\ 0 & 5 \end{bmatrix} \mathbf{y}$$

○ 1.57 rad (90°)

◉ 2.3 rad (131°)

○ -2.3 rad (−131°)

○ -1.57 rad (−90°)

✓ **Correct**
  Good job.

5.

Compute the angle between $\mathbf{x} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ and $\mathbf{y} = \begin{bmatrix} 2 \\ -1 \\ 0 \end{bmatrix}$ using the inner product defined by

$$\langle \mathbf{x}, \mathbf{y} \rangle = \mathbf{x}^T \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & -1 \\ 0 & -1 & 3 \end{bmatrix} \mathbf{y}$$

- ◉ 1.37 rad ($78°$)

- ○ 1.31 rad ($75°$)

- ○ 0.2 rad ($11°$)

✓ **Correct**
Well done!