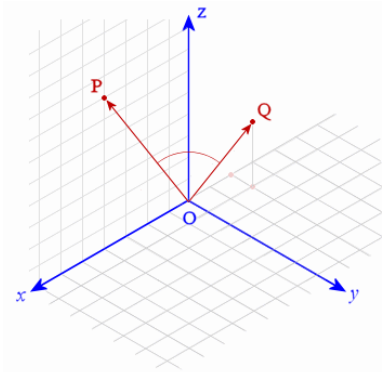
COMP110 Introduction to Computer Programming with MATLAB

# Homework #1

## Due date: February 21, 2018, Wednesday, 23:59.

## Evaluating the angle between two vectors in space




Write a MATLAB program that will evaluate the angle between two vectors in space.

1. First read from the keyboard the $\boldsymbol{P}_x$, $\boldsymbol{P}_y$, $\boldsymbol{P}_z$ components of a vector $\boldsymbol{P}$, and then the $\boldsymbol{Q}_x$, $\boldsymbol{Q}_y$, $\boldsymbol{Q}_z$ components of a vector $\boldsymbol{Q}$.
2. Evaluate the lengths of these vectors, $|\boldsymbol{P}|$ and $|\boldsymbol{Q}|$, using

$$|\boldsymbol{P}| = \sqrt{P_x^2 + P_y^2 + P_z^2}\,, \quad |\boldsymbol{Q}| = \sqrt{Q_x^2 + Q_y^2 + Q_z^2}$$

3. Evaluate the dot (scalar) product of the two vectors using

$$\boldsymbol{P}\bullet\boldsymbol{Q} = P_x Q_x + P_y Q_y + P_z Q_z$$

4. Now find the angle $\theta$ between the two vectors using the below formula. Use MATLAB's ***acos***() function. Note that MATLAB trigonometric functions take or yield angles in radians.

$$\theta = \arccos \frac{P \bullet Q}{|P||Q|}$$

5. Convert this angle to degrees, and display it on the screen. *Hint: 360° = 2π radians.*

The output of the program should look as below:

```
Enter P(x): 4
Enter P(y): 0
Enter P(z): 7
Enter Q(x): -2
Enter Q(y): 1
Enter Q(z): 3

The angle between P and Q is 64.4724 degrees.

>>
```

**Remember to include comments in your program.**

Name your MatLab m-file as h01*yourlastname*.m and then upload it to Blackboard Learn at http://ku.blackboard.com. Anyone *e-mailing* his/her homework will lose points!

***While doing all your homework assignments, remember that:***

- ***You should not work together,***
- ***You should not give or take any files,***
- ***You should not give or take help other than simple verbal hints.***