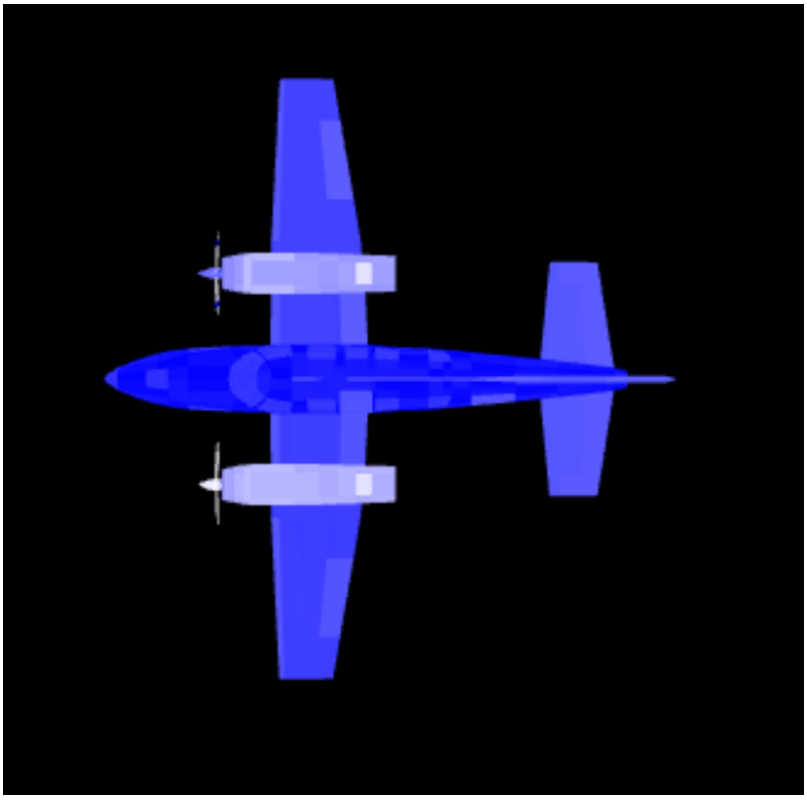
Part 1: Euler Angles

Question 1: Suppose our airplane is initially viewed from above, facing to the left:



For each of the following orientations of our airplane mesh, write down the yaw, pitch, and roll to that (approximate) plane rotation from our initial orientation. We assume for this problem that we apply Yaw, Pitch, and Roll in that order. Hint: use the `euler_angles` demo to help with finding angles. Hint: I recommend working "backwards", so starting with roll, then pitch, then yaw, since the rotations are (arguably) most intuitive in this order:

Orientation A:

Yaw=-90, Pitch=0, Roll=0

Orientation B:

Yaw=45, Pitch=45, Roll=0

Orientation C:

Yaw=0, Pitch=45, Roll=-45

Question 2: For each of the following questions, you will be given a picture of a jellyfish (with a direction it is facing, in case of image ambiguity), along with a rotation applied in the order yaw-pitch-roll. Sketch the expected orientation of this jellyfish after applying the provided yaw-pitch-roll. I have listed some reference orientations to help with your drawing in the Appendix:

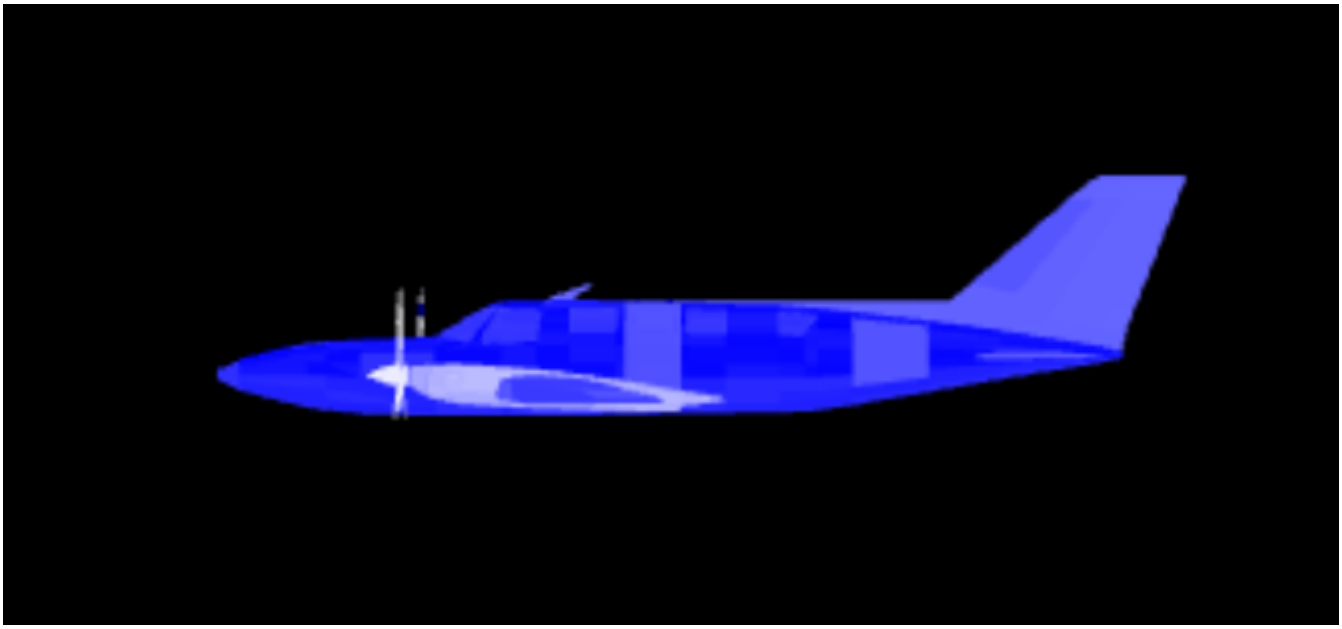
Rotation A: with yaw-pitch-roll of 90-90-0. Final Jellyfish: [0, 1, 0]

Rotation B: with yaw-pitch-roll of 0-90-270. Final Jellyfish: [-1, 0, 0]

Rotation C: with yaw-pitch-roll of 45-90-0. Final Jellyfish: [0, 1, 1]

Part 2: Quaternions:

Question 3: Suppose our airplane is initially viewed from the left, facing to the left of the screen:



For each of the following orientations of our airplane mesh, write down the quaternion we can use to get to that (approximate) plane rotation starting from our initial orientation. Hint: use the `quaternion` demo to help with finding angles. Hint: Quaternions can be counterintuitive to just "guess" with, so I recommend trying to think through which axis we need to rotate around to get the provided image.

Orientation A:

Q=[1, 0, 0, 0]

Orientation B:

Q=[0, .71, 0, .71]

Orientation C:

Q=[0, .71, .71, 0]

Question 4: For each of the following questions, you will be given a picture of a jellyfish (with a direction it is facing, in case of image ambiguity), along with a quaternion to be used as a rotation. Sketch the expected orientation of this jellyfish after applying rotation indicated by the provided quaternion. I have listed some reference orientations to help with your drawing in the Appendix:

Rotation A: applying the quaternion [1, 0, 0, 0]. Final Jellyfish: [-1, -1, 0]

Rotation B: applying the (unnormalized) quaternion [0, 0, 1, 1]. Final Jellyfish: [0, 1, 0]

Rotation C: applying the (unnormalized) quaternion [1, 1, 0, 0]. Final Jellyfish: [-1, 1, 0]