**6.*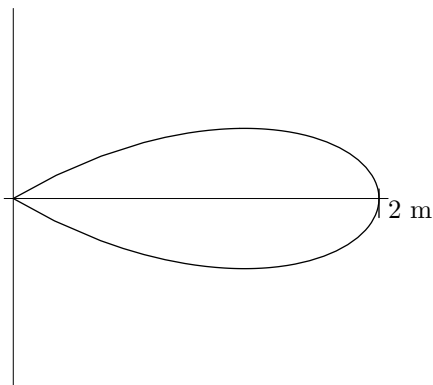* [16 points]   Chris has decided to take flying lessons, and notices that the cross-section of the airplane wing is given approximately by the figure to the right. The front-to-back length of the wing, as shown in the figure, is 2 m. The end-to-end length of the wing is 15 m (that is, its length along an axis coming out of this page is 15 m), and its ends are flat.

(a) [3 points of 16] If this cross-section is described by the polar equation $r = a\cos(3\theta)$, what is a?

(b) [4 points of 16] What range of values for θ generate this figure?

(c) [9 points of 16] Airplanes frequently have fuel tanks in their wings. If 75% of the wing's volume is available space for a fuel tank, what volume of fuel could be stored in this wing?