Math 10460 - Honors Mathematics II
Homework 2b - Due Wednesday, January 27

(2) (a) Graph the polar equation $r = 1 + \cos\theta$. This is called a *cardioid*.

(b) How does the integral $\sqrt{2}\displaystyle\int_0^{\pi} \sqrt{1+\cos\theta}\,d\theta$ relate to the length of the cardioid? Compute this integral, and then give the length of the full cardioid. *Hint*: Use the substitution $u = 1 + \cos\theta$ to get the integral started. An additional substitution will be needed.

(3) Find an integral giving the length of the piece of the parabola $r = \dfrac{1}{1+\cos\theta}$ to the right of the y-axis.

(4) What is the length of the polar curve $r = 4(\cos\theta + \sin\theta)$? *Hint*: What is this a graph of?

(5) Exercise 12.38 from the text

(6) Exercise 12.29 from the text

(7) Exercise 12.30 from the text