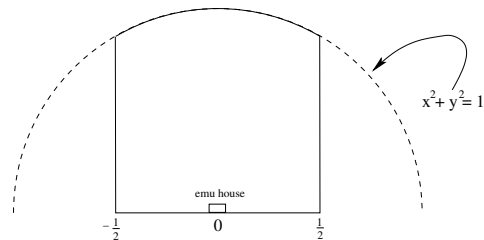


## MAT126, Paper Homework “Emu”

Due in recitation between 10/17 and 10/22

Answer both questions below. To get full credit, you must **justify your answers**;  
just writing an answer, even if correct, will not earn full points.

1. Melissa has moved to Australia to become an emu rancher. She has acquired a square plot of land 1 km by 1 km, with an emu house located at the center of the southern edge. The emus are outfitted with special tracking devices that must remain no more than 1 km from the emu house, so the northern border of the ranch has a fence which is part of a circle. Calculate the area within the fence. This area is best expressed as an integral. Make sure you state the integral. It is OK if you use an online resource to calculate the integral, but acknowledge which one you used, and give an exact answer, not a decimal approximation.



2. After being kidnapped on a trip to Canada, little Jimmy was able to see the speedometer of the kidnapper’s car, and carefully noted down the speeds (in  $km/hr$ ) every tenth of an hour (six minutes). Jimmy was able to send these speeds to his friend Juan via a message tied to the leg of a pigeon. Juan wants to figure out how far away Jimmy is from where they nabbed him.

time $t$	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1
speed $v(t)$	30	60	81	93	94	80	70	40	52	20	0

- Using the trapezoid rule, estimate the total distance (in  $km$ ) that Jimmy was taken, that is, estimate the integral  $\int_0^1 v(t) dt$ . (Use only the data provided—don’t average to guess at times not listed.)
- Using the assumption  $-10 \frac{km}{hr^2} \leq v''(t) \leq 10 \frac{km}{hr^2}$ , determine the maximum error in your estimate.

