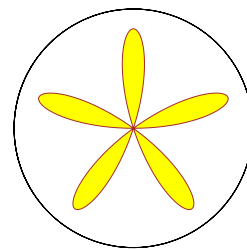


MAT126, Paper Homework “Wax”

1. The average (mean) [height of an American male](#) is about 176 cm (5' 9"), with a standard deviation of about 9 cm. Variations in height are well-modeled by a normal distribution, with the density function $\frac{1}{\sqrt{2\sigma^2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ where μ is the mean and σ is the standard deviation.

Write an integral which represents the probability of an American man being more than 200 cm (about 6' 6 $\frac{3}{4}$ ") tall, and then use a computer program like [Wolfram Alpha](#) to calculate the probability to at least 3 significant figures. ([Symbolab](#) will give you an answer involving *erf* or *erfc*, but you need to evaluate this as a number; the calculator on [Google](#) knows those functions if you type them in the search bar.)

2. In addition to the star-shaped candles [Zhulong](#) makes for his candle store (as in problem 4 of the [Fall 2016 second midterm](#)), he also makes “[sand-dollar](#) candles”. These have an inner area filled with colored beeswax, with regular wax on the outside. The beeswax area can be described as the interior of the polar curve $r = \sin(5\theta)$ (r is measured in inches); the outside is a circle. A cross-section of the candle is shown at right.



- Find the area of the beeswax part of a candle cross-section. (Be careful about the range of θ .)
- Then, calculate how much beeswax is needed for a 5 inch tall candle (the candle is not tapered— all cross sections are the same).