

MA 16021 — Problem Set #2

Fall 2015

Names _____

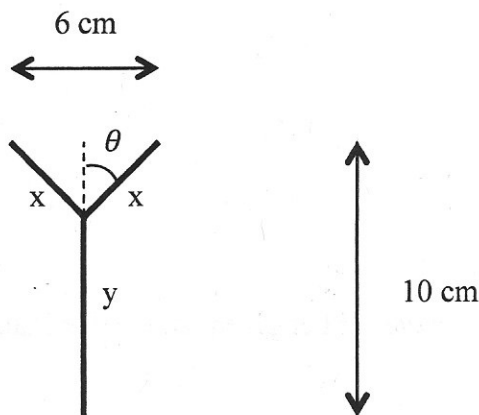
Authorized aid: Your textbook, your class notes, a calculator, the Desmos graphing calculator, your partner, the instructor

Unauthorized aid: Anything and anyone not mentioned above

You must show work to obtain credit and provide explanations where requested.

Please do all work on a separate sheet of paper. Attach this page, with signed honor statement as your cover sheet.

1. A missile is launched and travels along a path that can be represented by $y = \sqrt{x}$. A radar tracking station is located 2 kilometers (km) directly behind the launch pad. Placing the launch pad at the origin and the radar station at $(-2,0)$, find the largest angle of elevation required of the radar to track the missile. At what point of the path does this occur?
2. A Y-shaped metal bracket is to be made such that its height is 10 centimeters and its width across the top is 6 centimeters (see diagram below). What values of x , y , and θ will result in the bracket that requires the least (linear) amount of material?



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3. The roof of a sports arena is the surface generated by revolving $y = 20 \cos(0.000245x^2) + 20$, $0 \leq x \leq 80$, about the y -axis. Both x and y are measured in meters.
- a) Find the volume within the arena.
 - b) If the roof was flat instead of curved, what would its height have to be so that the volume within the arena was the same?
 - c) What is the average value of the function $y = 20 \cos(0.000245x^2) + 20$ on the interval $0 \leq x \leq 80$?
4. After an electric power interruption, the current i in a circuit is given by $i = 3(1 - e^{-t})^2(e^{-t})$, where t is the time. Find the expression for the total electric charge q to pass a point in the circuit if $q = 0$ for $t = 0$. Recall that $q = \int i \, dt$.

Honor Statement: I have neither given nor received unauthorized aid on this assignment.

Signed: _____
