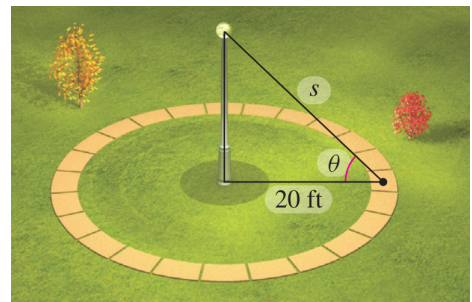

April 1, 2019

MTH 150
Quiz 7

Name: _____

Instructions: This take-home quiz must be completed and submitted at the **beginning of class** on Monday April 1, 2019. No late submissions will be accepted. If you are unable to attend class that day, you must make plans to either submit to my mailbox before class or send it with a classmate to turn in during class. You may use course resources (textbook, notes, etc.), but may not use “outside” resources like the tutoring center. You must show all of your work to receive any credit, and all of the work shown must be your own. That is, if you decide to work with others, make sure you still understand (and can explain) the work you submit.

Problem 1. A circular area of radius 20 ft is surrounded by a paved pathway. A lamppost is placed in the middle of the circular area. What height should the light be to illuminate the walk most strongly? The intensity of illumination is $I = \frac{\sin \theta}{s}$ where s is the distance from the source and θ is the angle at which the light hits the surface. **(4 points)**



Problem 2. A cylindrical soda can is being designed to hold a volume of approximately 21.7 in^3 .

(a) Find the dimensions of the can (radius and height) that will minimize the amount of material used (surface area). **(4 points)**

(b) The actual dimensions of a can of soda are $h \approx 4.8 \text{ in}$ and $r \approx 1.2 \text{ in}$. Your answers are likely not the same as these realistic dimensions. Why? What assumptions have we made that may not be correct? **(2 points)**