Math2415 Spring 2018

Student Name: _____

Student CWID: _____

CORE OBJECTIVE ASSESSMENT TEAM (COAT) assessment instrument.

Math2415 Calculus III Critical Thinking

To Student : This lab will be used as a tool to assess your critical thinking skills. The following rubric will be used to evaluate your work on this lab. This lab will **NOT** count towards your overall lab grade. Each student will turn in his own individual work. Please work diligently and show your best work on this assignment and you may refer back to this rubric as you complete each step of the assignment. You may use the textbook (hardcover or ebook) , lecture notes, and your calculator.

Analysis : Student identifies, interprets, and summarizes the issue / problem

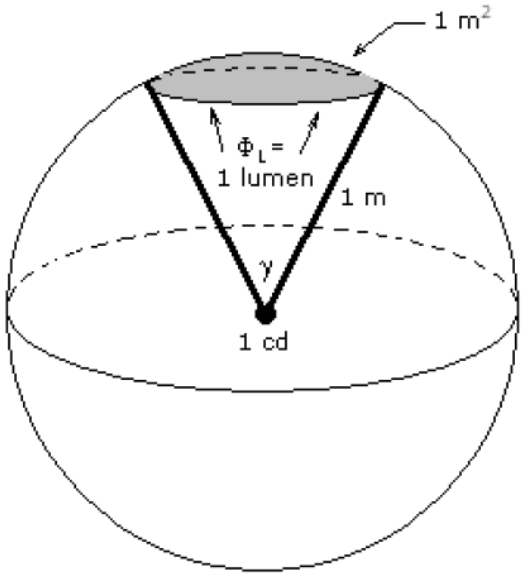
Inquiry: Student seeks information using data, ideas, or perspectives pertaining to the issue / problem

Evaluation : Student uses relevant arguments to support a conclusion

Synthesis: Student communicates a cohesive conclusion

Creativity/Innovation: Student uses new ideas or approaches that are relevant to the task or problem

PROBLEM SITUATION :



A 1-candle (cd) light strength (equivalent to 6 mm^2 of platinum at its solidification point, ~1773°C) is located at the center of the sphere shown with radius 1 meter. For a *certain* solid angle γ to be determined here, called a steradian (sr), the cone intersects the sphere in such manner as to create the shaded area on the surface equal to 1 m^2, or $1/4\pi$ fraction of the sphere's total area of 4π. The resultant light field **L** yields a luminous flux Φ_L of 1 lumen (cd-sr) outward through this cone and a luminous flux density on the shaded part of the sphere's surface of 1 lux (lumen/m^2). Calculate this steradian cross-section angle γ in degrees to two decimal places.

1) (Analysis) Write a complete sentence describing what general type of multivariable calculus problem this is, and then write a general integral form previously learned to be used in the solution of this problem.

2) (Inquiry) From the analysis in 1), determine the integrand and the value to which this multiple integral is to be set.

3) (Evaluation) Sketch the projected region (domain D) and set up the multiple integral with all necessary limits of integration, changing coordinate systems if appropriate, set it equal to the proper value of this integral from the given information, and then evaluate the integral as a function of the unknown quantity.

4) (Synthesis) Perform the algebra necessary to solve the equation in 3) for the unknown quantity, and convert (if necessary) to the proper units requested. Write a complete sentence describing what this value indicates in this application.

5) (Creativity/Innovation) Without actually reevaluating, how might you set this problem up differently by using a surface parametrization?