ACTIVITY#7-Math~151-Calculus~II-Spring~2021

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Professor/TA:		Sec:	RedID:	
NAME (printed):		Partners:		
	(Family Name)	(First Name)		
Surface area of a telescope mirror		Objective mirror		
Consider the diagram of a Cassegrain telescope to the right. As the diagram shows, the objec- tive mirror needs a small hole (of radius R_1) to let the light rays go through. Suppose that the radius of the objective mirror is R_2 . What is the surface area of the objective mirror if the surface of the mirror has the parabolic (cross- sectional cut) profile $x = \beta y^2$ where β is a, positive, fixed constant?		(with hole in center)	Convex mirror	Prime focus

- (a) In the graph, outline in bold the curve corresponding to the objective (main) mirror's surface that needs to be coated (and thus calculated). Brainstorm methods for using integration to calculate the surface area of the objective mirror.
- (b) Draw a diagram showing the function (the cross-sectional profile) that you need to revolve about the x-axis to get the shape of the objective mirror. Please include the two radii R_1 and R_2 .

(c) Write a y-integral (but do not solve it/evaluate it) giving the area A of the mirror that has to be coated by using the area of revolution.

(d) Write an x-integral (but do not solve it/evaluate it) giving the area A.

(e) Compute both the y- and x-integrals and compare the results.

(f) If instead of a parabolic mirror one uses a flat mirror (with the same radii), which mirror has more area?