Name_____

Homework Assignment #11 due in class Friday November 18

Staple this cover sheet in front of your solutions.

Write the requested answers on this sheet, and do the detailed calculations on your own paper.

[50] The problem on the back of the page.

Answer: The time can be written in the form x.xxx sqrt(a/g). What is x.xxx?

_____

[51] Problem 6.7 *

Answer: Explain why the geodesic has the form it does.

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[52] Problem 6.8 *

Answer: Explain why.

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[53] Problems 6.10* and 6.20**

No answer is required here.

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[54] Problems 6.1* and 6.16**

Answer: Describe the corresponding geodesics if point 1 is on the z axis.
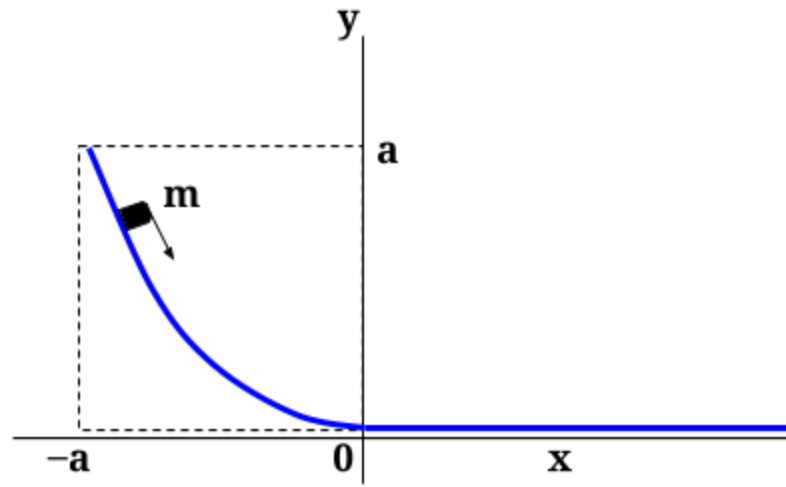
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[55] Problem 6.19 **

Answer: Sketch a picture of the surface.

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[56] Problem 6.25 ***

Answer: Explain qualitatively how this surprising result can possibly be true.

[50] A mass m slides without friction in Earth's gravity down the track shown in the figure; the equation for the track is $y = x^2/a$ for $x < 0$ and $y = 0$ for $x > 0$. The initial point is $\{x,y\}=\{-a, a\}$ and the initial velocity is 0.

The energy is $E = \frac{1}{2} m \, (\dot{x}^2 + \dot{y}^2) + mgy$

(A) Prove that as the mass slides down,

$$\dot{y} = -\text{sqrt}(2ga) \; y^{1/2} (1 - y/a)^{1/2} \, (y + a/4)^{-1/2}$$

(B) Calculate the time when the mass passes the point $\{x,y\}=\{0,0\}$. *The time can be written as $t = x.xxx \; \text{sqrt}(a/g)$ where $x.xxx$ is a decimal number. What is the number? (Use Mathematica to calculate the integral.)*