METÓDY RIEŠENIA FYZIKÁLNYCH ÚLOH 1 leto19 – Príklady 3
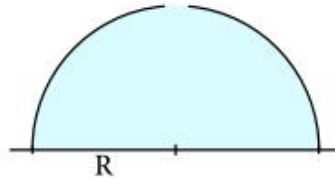
Cvičenie 28.3.2019

Príklad 1

23 Čajka už viac variť nebude! Dutú nádobu tvaru polgule s polomerom R otočila hore dnom a vyvŕtala do nej dieru. Následne začala do diery nalievať vodu s hustotou ρ. Skôr, než by sa nádoba naplnila, voda nádobu nadvihla a pretiekla popod jej steny. Aká najväčšia mohla byť hmotnosť nádoby, aby táto situácia mohla nastať?

R

Príklad 2

Two parallel plates plates are maintained at temperatures T_L and T_R respectively and have emissivities ϵ_L and ϵ_R respectively. Given the Stephan-Boltzmann constant σ, express the net energy transfer rate per area from the left plate (L) to the right plate (R). *Hint:* this problem can be solved by using an infinite series, or by finding the energy transfer rate per area to the right and left, I_R and I_L, respectively.

Príklad 3

There are 2014 points on a giant circuit board. Each point is connected to each of the other points by a wire with resistance r. Find the resistance R between any two points.

Príklad 4

PROBLEM: Starting from rest at $(x, y) = (0, 0)$, a particle slides down a frictionless hill whose shape is given by the equation $y = -ax^n$, $a > 0$ and $n > 0$. Determine the range of allowed n for which the particle leaves the surface, and the x location at which this occurs. Assume gravity is constant, in the $-y$ direction.

Príklad 5

PROBLEM: A current I flows through a wire made of a piece of material 1 and a piece of material 2 of identical cross-sections A welded end-to-end as shown in the figure. The resistivity of material 1 is ρ_1, the resistivity of material 2 is ρ_2. How much electric charge accumulates at the boundary between the two materials?