Dr. Sasha

It is the information about the task N19

4) I used you expression for speed of the spacecraft $v(t)=\dfrac{v_0}{\sqrt{1+\dfrac{2\rho\cdot v_0\cdot A\cdot t}{m_0}}}$. Then, the length $L[a,b]$ (total distance traveled between time a and time b) of the path $x(t)$ for $t\in(0,\infty)$ is

$$L=x(t)\Big|_{t=0}^{t=\infty}=\int_0^{\infty}v(t)dt=\frac{m_0}{\rho\cdot A}\sqrt{1+\frac{2\rho\cdot v_0\cdot A\cdot t}{m_0}}\Bigg|_{t=0}^{t=\infty}=\infty \qquad (1)$$

How it is possible, that the path length of the spacecraft is infinity? Do you think the spacecraft will not stop?

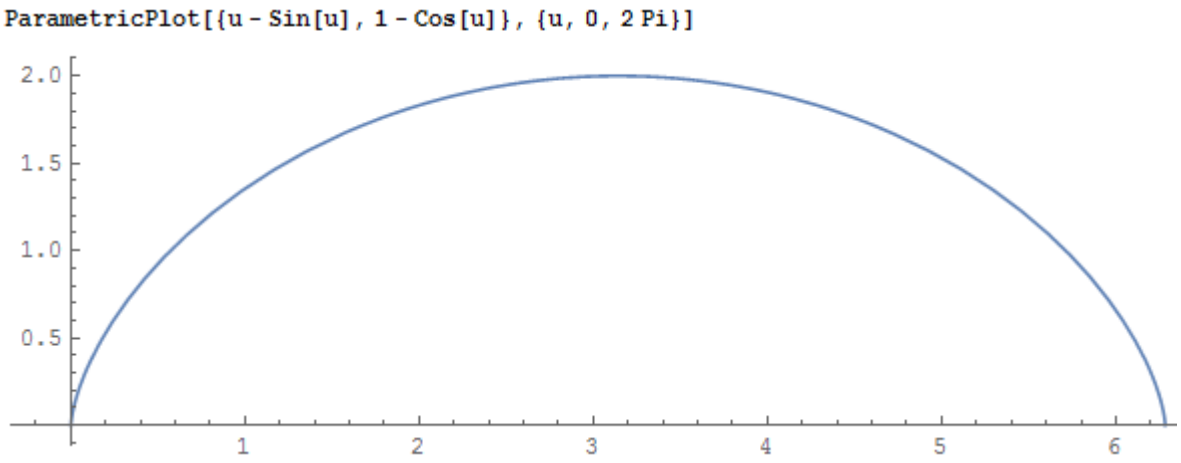
It is the information about the task N20

1) - correctly solved problem.

2) It is the citation from your text (file answer20.pdf)

2. The angular velocity appears to be $\omega = 1$, and the radius is a. So the linear velocity is $v = \omega a = a$, and the arc length is $l = 2\pi a$.

It is the plot of one arch of the cycloid $x(t)=a\cdot t-a\sin(t)$, $y(t)=a-a\cos(t)$ ($a=1$).



Do you really believe that, the one arc length is 2π for $a=1$?

3) - correctly solved problem.

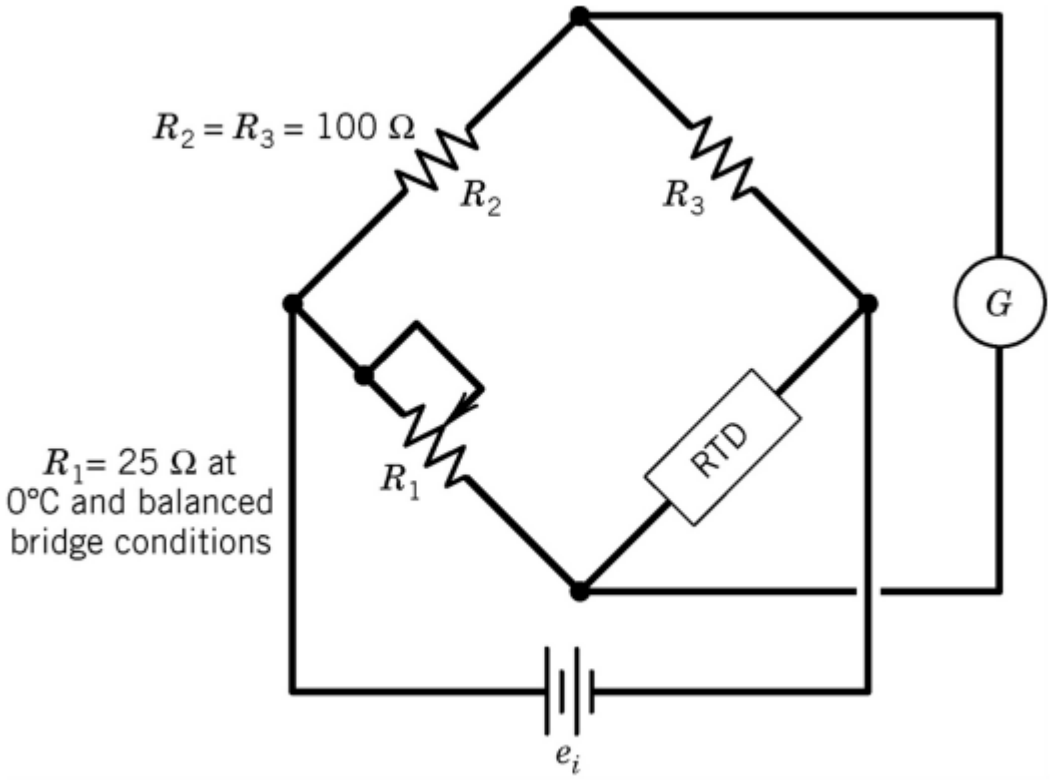
Please, solve this problem and also show the steps to solve it.

23.06.2015 – N22

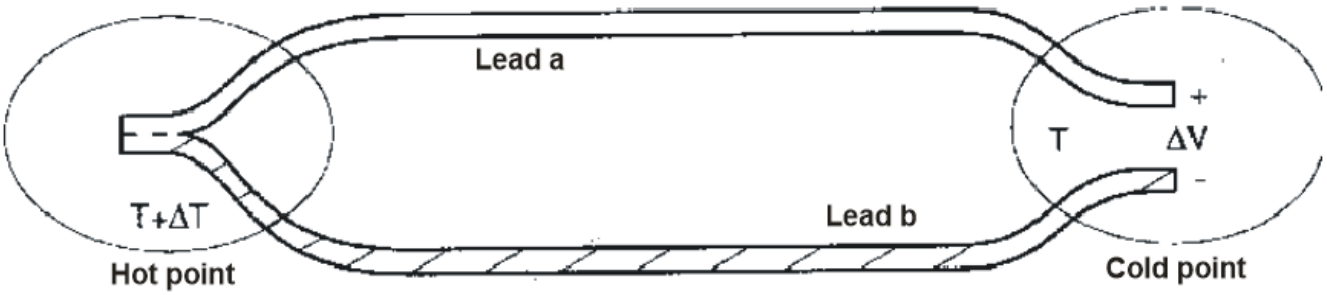
1) S The number density of free electrons in gold is 5.9×10^{28} electrons per cubic meter. If a metal strip of gold 2 cm wide carries a current of 10 A, how thin would it need to be to produce a Hall Voltage of at least one 1 mV. What would the drift velocity of the electrons be in this case? (Assume a perpendicular field of 0.5 T).

2) What is the difference between an incandescent lamp source and a gas discharge lamp?

3) Calculate the temperature indicated by the RTD (resistive temperature detector) in the figure below if $\alpha = 0.003925\frac{\text{ohm}}{^0\text{C}}$, $R_0 = 25\Omega$ at 0°C and $R_1 = 37\Omega$ to balance the bridge.



4) Let lead **a** be chrome and lead **b** be copper and assume T=300K and ΔT = 5 K. Calculate ΔV. Use the Seebeck coefficients from the table.



Hint: a sign convention $S = -\dfrac{V_{left} - V_{right}}{T_{left} - T_{right}}$.