Technische Universität München
Physik-Department **B. Garbrecht, C. Tamarit, G. Zattera**

Mechanik (Theoretische Physik 1)

Sommersemester 2018

Abgabe bis Freitag, 20.04.18, 12:00 neben PH 3218.

Übungsblatt Nr. 2 Dieses Blatt wird in den Übungen vom 23.04. - 27.04.18 besprochen.

Aufgabe 1:
Cycloid — 3 Punkte

Determine the trajectory of a certain point on a circle of radius R, which rolls along a horizontal line at constant angular velocity ω. Assume that for $t = 0$, the point is on that line and at the origin of the reference frame.

Aufgabe 2:
Atwood machine — 3 Punkte

A thread of length L connects two masses m_1 and m_2 ($m_1 < m_2$). The gravitation of Earth points in x directions.

1. What are the equations of motion for m_1 and m_2?
2. Compute the acceleration of the masses as a function of m_1 and m_2.
3. How large is the the tension, i.e. the force along the thread?

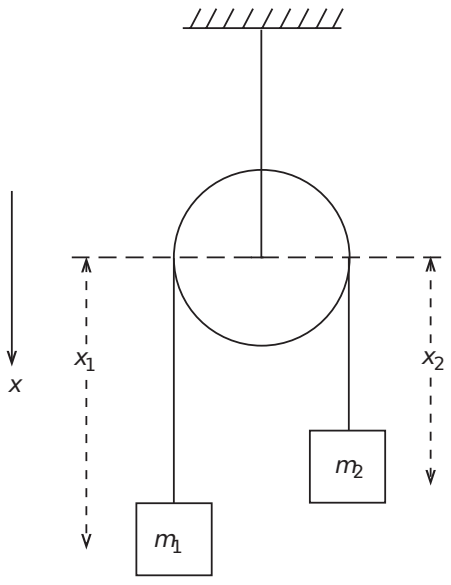

Abbildung 1: Atwood Maschine.

Aufgabe 3:
Anhamrmonic oscillator **4 Punkte**

A body of mass m moves in the potential

$$U(x) = \frac{f}{2}x^2 + \alpha x^4. \tag{1}$$

Compute the period $T$of the oscillation in the harmonic ($\alpha = 0$) and the slightly anharmonic ($\alpha E \ll f^2$) case.
Hint: Substitute $U(x)/E \equiv \sin^2 \varphi$ and express x and dx in dependence of φ up to 1. order in α.