Phys 3344:

Office Hours: Wed 5:00-6:00 Phone #'s sheet

Schedule: Exam #1: Thur/Friday 17-18 Sept

Homework #2:

Homework #3:

Atwood Machine:

- No pulley
- With pulley

Divergence Theorem

Line Integrals

	2020 FALL PHYS 3344				
#	DAY	LECTURE:	NOTES:	Chpt	TOPIC
1	TUE	08/25/20	First Class	1	Newtons Laws
2	THUR	08/27/20		2	Projectiles
3	TUE	09/01/20		3	Momentum & Angular Momentum
4	THUR	09/03/20		4	Energy
5	TUE	09/08/20		5	Oscillations
6	THUR	09/10/20			
7	TUE	09/15/20			
8	THUR	09/17/20			**EXAM 1**
9	TUE	09/22/20		6	Calculus of Variations
10	THUR	09/24/20		7	Lagrange's Equation
11	TUE	09/29/20			
12	THUR	10/01/20		8	Two Body Problems
13	TUE	10/06/20			
14	THUR	10/08/20		9	Non-Inertial Frames
	TUE	10/13/20	**Fall Break**		
15	THUR	10/15/20		10	Rotational Motion
16	TUE	10/20/20			**EXAM 2**
17	THUR	10/22/20			
18	TUE	10/27/20		10	Rotational Motion
19	THUR	10/29/20			
20	TUE	11/03/20		11	Coupled Oscillations
21	THUR	11/05/20			
22	TUE	11/10/20		13	Hamiltonian Mechanics
23	THUR	11/12/20			
24	TUE	11/17/20			
25	THUR	11/19/20		14	Collision Theory
26	TUE	11/24/20			
27	THUR	11/26/20	**Thanksgiving**		
28	TUE	12/01/20		15	Special relativity
29	THUR	12/03/20	Last Class		Review
	WED	**Dec 16**	**FINAL EXAM**	**Wednesday Dec. 16,2020, 11:30am - 2:30**	

Divergence theorem.
In two dimensions, it is equivalent to Green's theorem

$$\boxed{\int_V \partial F = \int_{\partial V} F}$$

volume integral

$$\iiint_V (\nabla \cdot \mathbf{F})\, dV = \oiint_S (\mathbf{F} \cdot \mathbf{n})\, dS.$$

surface integral

Name	Integral equations	Differential equations
Gauss's law	surface integral $\oiint_{\partial\Omega} \mathbf{E} \cdot \mathrm{d}\mathbf{S} = 4\pi \iiint_\Omega \rho \, \mathrm{d}V$ volume integral	$\nabla \cdot \mathbf{E} = 4\pi\rho$
Gauss's law for magnetism	$\oiint_{\partial\Omega} \mathbf{B} \cdot \mathrm{d}\mathbf{S} = 0$	$\nabla \cdot \mathbf{B} = 0$
Maxwell–Faraday equation (Faraday's law of induction)	$\oint_{\partial\Sigma} \mathbf{E} \cdot \mathrm{d}\boldsymbol{\ell} = -\frac{1}{c}\frac{\mathrm{d}}{\mathrm{d}t} \iint_\Sigma \mathbf{B} \cdot \mathrm{d}\mathbf{S}$	$\nabla \times \mathbf{E} = -\frac{1}{c}\frac{\partial \mathbf{B}}{\partial t}$
Ampère's circuital law (with Maxwell's addition)	$\oint_{\partial\Sigma} \mathbf{B} \cdot \mathrm{d}\boldsymbol{\ell} = \frac{1}{c}\left(4\pi \iint_\Sigma \mathbf{J} \cdot \mathrm{d}\mathbf{S} + \frac{\mathrm{d}}{\mathrm{d}t} \iint_\Sigma \mathbf{E} \cdot \mathrm{d}\mathbf{S}\right)$	$\nabla \times \mathbf{B} = \frac{1}{c}\left(4\pi\mathbf{J} + \frac{\partial \mathbf{E}}{\partial t}\right)$

Conservative Forces: if F=- ∇U

$$F = -\nabla U \qquad \int_a^b F = \int_a^b -\nabla U = -U_b + U_a = \Delta U_{ab}$$

Independent of path

Contents

* Sections marked with an asterisk could be omitted on a first reading.

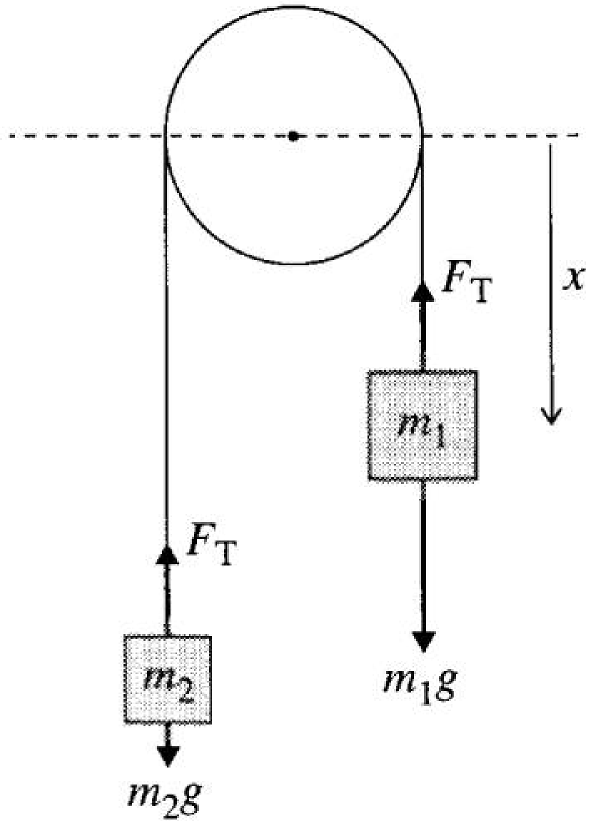

Figure 4.15 An Atwood machine consisting of two masses, m_1 and m_2, suspended by a massless inextensible string that passes over a massless, frictionless pulley. Because the string's length is fixed, the position of the whole system is specified by the distance x of m_1 below any convenient fixed level. The forces on the two masses are their weights $m_1 g$ and $m_2 g$, and the tension forces F_T (which are equal since the pulley and string are massless).

$F = m\, a$

$F_T - m_1\, g = m_1\, a_1$

$F_T - m_2\, g = m_2\, a_2$

$a_1 = - a_2$

Unknowns: F_T, a_1, a_2