Test Information for Test 2:

Formulas to memorize:

Resistors

$\Delta V = IR$

$\mathcal{P} = I\Delta V$

Series:

$R = R_1 + R_2$

Parallel:

$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

Magnetic Force

$\mathbf{F} = q\left(\mathbf{E} + \mathbf{v} \times \mathbf{B}\right)$

$\mathbf{F} = I\mathbf{L} \times \mathbf{B}$

RC Circuits

$\tau = RC$

Units

V = N·m/C

A = C/s

T = N/A/m

Kirchoff's Laws

$\sum I_{\text{in}} = \sum I_{\text{out}}$

$0 = \sum_{\text{loop}} \Delta V$

With Capacitors:

$I = dQ/dt$

$\Delta V = Q/C$

Ampere's Law

$\oint \mathbf{B} \cdot d\mathbf{s} = \mu_0 I_{\text{in}} + \mu_0 \varepsilon_0 \frac{d\Phi_E}{dt}$

Gauss's Law Magnetism

$\oint_S \mathbf{B} \cdot \hat{\mathbf{n}} dA = 0$

Faraday's Law

$\mathcal{E} = -\frac{d\Phi_B}{dt}$

Formulas to know how to use, but you need not memorize:

Constants

$e = 1.602 \times 10^{-19}\,\text{C}$

$\varepsilon_0 = 8.854 \times 10^{-12}\,\text{C}^2/\text{N/m}^2$

$\mu_0 = 4\pi \times 10^{-7}\ \text{T} \cdot \text{m/A}$

Cyclotron Motion

$mv = qRB$

$\omega = \frac{qB}{m}$

Hall Effect

$\Delta V_H = \frac{IB}{tnq}$

Loops

$\boldsymbol{\tau} = I\mathbf{A} \times \mathbf{B}$

$U = -I\mathbf{A} \cdot \mathbf{B}$

Biot-Savart

$\mathbf{B} = \frac{\mu_0 I}{4\pi} \int \frac{d\mathbf{s} \times \hat{\mathbf{r}}}{r^2}$

RC Circuits

$Q = Q_0 e^{-t/\tau}$

$Q = C\mathcal{E}\left(1 - e^{-t/\tau}\right)$

Solenoid

$B_{\text{in}} = \mu_0 NI/\ell$

Field from Wire

$B = \frac{\mu_0 I}{4\pi a}\left(\cos\theta_1 + \cos\theta_2\right)$

$B = \frac{\mu_0 I}{2\pi a}$

General Comments on Working Out Problems

The test isn't exactly like webassign, and therefore the problems won't be quite the same. First, and this is important, I *do* take credit off for not showing units. Keeping track of units is an important part of physics, and often helps us recognize and check our mistakes.

In Webassign, keeping calculations to two or three digits is always correct. On tests, you should generally follow the standard rules of significant digits. However, I don't mind if you keep an extra digit (or even two) beyond those given in the problem. What I don't want to see is answers like E = 36180359 V/m. Rewrite answers like this in scientific notation, 3.62×10^7 V/m, or better still, 36.2 MV/m.

Material for test 2:

Chapter 28	DC Circuits
Chapter 29	Magnetic Field and Forces
Chapter 30	Sources of Magnetic Fields
Chapter 31	Faraday's Law
Chapter 32	Inductance

Organization of the Test:

Part I: Multiple Choice [20 points]
For each question, choose the best answer (2 points each)

[questions 1-10]

Part II: Short answer [20 points]

Choose **two** of the following questions and give a short answer (1-3 sentences) (10 points each).

[questions 11-13]

Part III: Calculation: [60 points]

Choose **three** of the following four questions and perform the indicated calculations (20 points each)

[questions 14-17]