MIDTERM 2

Physics 9C-03 NAME:

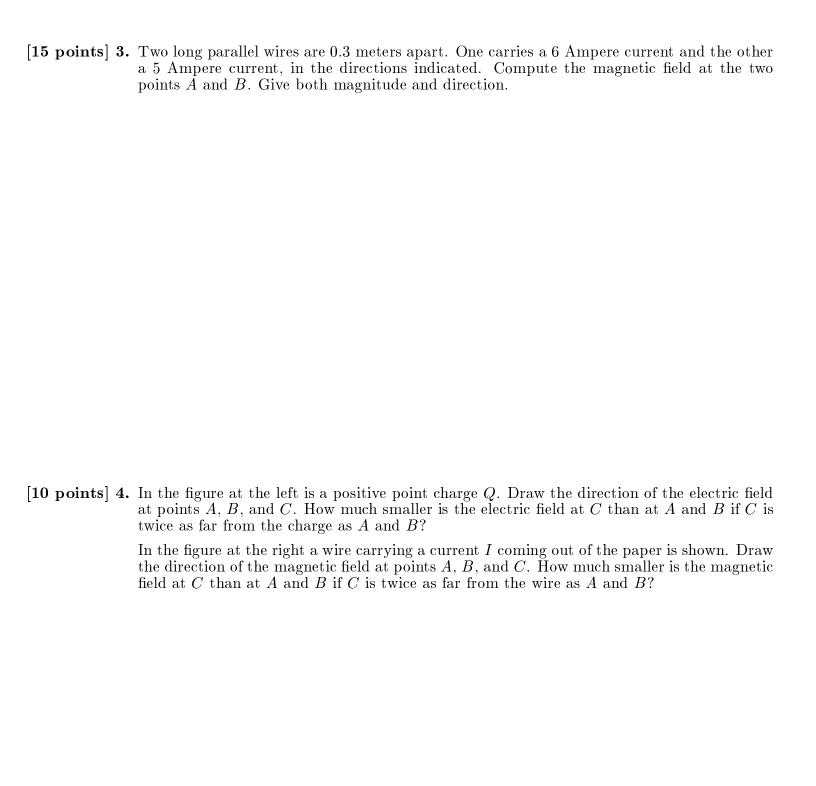
Feb. 22, 2001

Student ID #:

General Instructions: This examination is closed book. Only a calculator is allowed. Please show all your work and box your answers. Credit will only be given for *complete* solutions. Answers must have correct units. There are seven problems on four pages. Note that not all the problems are worth the same number of points.

[15 points] 1. Derive the formula for the capacitance of a parallel plate capacitor.

[10 points] 2. In the circuit shown the capacitor holds a charge Q_0 at time t=0 when the switch is closed. Sketch Q(t). Label your time axis with appropriate numbers.



[20 points] 5.	Consider the circuit shown. The charge on the capacitor is zero initially. Carefully explaining your reasoning, compute:
	The currents in the resistors right after the switch is closed;
	The currents in the resistors after a long time passes;
	The charge on the capacitor after a long time passes.

[10 points] 6. Ask someone about magnetism, and they'll probably talk about magnets. The connection

between magnets and \vec{B} field producing currents isn't an obvious one. Try to find it. Where is the 'current' in a magnet?

[20 points] 7. A wire of radius R carries a current I. The current density in the wire is uniform. Compute the magnetic field both inside and outside the wire using Ampere's law. For full credit, make sure you write a clear explanation of all the terms you use in your equations. Make a plot of $|\vec{B}|$ as a function of distance from the center of the wire.