5.) Consider a bicycle-style exercise machine that has been converted to generate electricity. The pedals are mounted on crankshafts with a 20 cm radius. A person in good physical condition can turn the pair of pedals at 80 RPM against a resistance of 20 N on each pedal and do this continuously for an hour or more. Assuming the whole machine from pedals to electrical output is 75 percent efficient. . .

a.) How much electrical power can be produced by one such machine with a well-conditioned person working it? (Don't forget— The exercise bicycle has two pedals and you may assume the rider has two feet!)

b.) Consider installing a bunch of these machines in a "fitness center" and paying people to "ride" them. Assume the electricity produced can be sold at wholesale for 2 cents per kilowatt-hour and that riders can be paid half of that (1 cent per kilowatt hour), the remaining amount being used to repair and maintain the machines and make a profit. Also, suppose that this fitness center has no heat or air conditioning, indeed it consumes no electricity at all so that every kilowatt-hour produced is sold! It is illuminated and ventilated via windows. What will the hourly wage be for a "well conditioned rider?"

6.) The "Introduction to Electrical Engineering" handout mentions that China's Three Gorges Dam is a controversial project. North America also has its share of controversial electrical power projects. Use the Internet or the library to answer the following questions: (Please use a word processor to write your answers.)

a.) In what year was electric power first generated at the Glen Canyon Dam?

b.) How much electric power generation, in GW, is installed at the Glen Canyon Dam (installed capacity)?

c.) As a percentage, how does the power generation capacity of Glen Ganyon Dam compare to that of Niagara Falls (both the U.S. and Canadian sides) and the plans for the Three Gorges Dam?

d.) Using 200 words or less, present the best argument you can for keeping and maintaining the Glen Canyon Dam.

e.) Using 200 words or less, present the best argument you can for removing the Glen Canyon Dam.

Some suggested sources:
[a] http://www.usbr.gov/projects/Facility.jsp?fac_Name=Glen+Canyon+Dam
[b] http://www.livingrivers.org/campaigns/grandcanyon/article5.cfm
[c] http://www2.kenyon.edu/projects/Dams/
[d] http://www.google.com/search?hl=en&q=glenn+canyon+dam+hydroelectric+power&btnG=Google+Search

7.) Some tests are performed on an electric motor used to operate a grain auger. The motor operates on 240 V RMS, 60 Hz AC power. The motor draws 9.5 A RMS and the power factor is 0.8. The motor is 90% efficient. How much electrical power does the motor draw? How much mechanical power does it produce?