PHYS 202 Faraday’s Law Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Faraday’s law of induction is given below; 

1. Explain how a bolt of lightning can produce a current in the circuit of an electrical appliance, even when the lightning does not directly strike the appliance.

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| 2. [CJ10-Ch22-P14] A loop of wire has the shape shown in the drawing. The top part of the wire is bent into a semicircle of radius *r*pixel=pixel0.20 m. The normal to the plane of the loop is parallel to a constant magnetic field of magnitude 0.75 T. What is the change in the magnetic flux that passes through the loop when, starting with the position shown in the drawing, a semicircle is rotated through half a revolution? (Ans: -9.4 x 10-2 Wb) |

3. [CJ10-Ch22-P20] Magnetic resonance imaging (MRI) is a medical technique for producing pictures of the interior of the body. The patient is placed within a strong magnetic field. One safety concern is what would happen to the positively and negatively charged particles in the body fluids if an equipment failure caused the magnetic field to be shut off suddenly. An induced emf could cause these particles to flow, producing an electric current within the body. Suppose the largest surface of the body through which flux passes has an area of 0.032 m2 and a normal that is parallel to a magnetic field of 1.5 T. Determine the smallest time period during which the field can be allowed to vanish if the magnitude of the average induced emf is to be kept less than 0.010 V. (Ans: 4.8 s)