Physics 2212 CRN 24320 **Quiz 7** Name _____

1. A coil of 50 turns and radius of 12 cm is positioned in a magnetic field. The coil is rotated at an angular speed of 42 rad/s, and while the direction of the magnetic field is constant, the magnitude changes as a function of time following the function $B(t) = (1.2\,T)e^{-0.013t}$. If the coil's area vector is parallel to the B-field vector at t=0, Find the EMF across the coil at time $t = 14\,s$. **SHOW ALL WORK**

$$\Phi = \vec{B} \cdot \vec{A} = (1.2e^{-.013t})(\pi)(.12)^2\, cos(\omega t)$$

$$\epsilon = -N\frac{d\Phi}{dt} = -(50)\frac{d}{dt}\left(1.2e^{-.013t}(\pi)(.12)^2\, cos(\omega t)\right)$$

$$\epsilon = -(50)(\pi)(1.2)(.12)^2\left((-.013)e^{-.013t}\, cos(42t) - e^{-.013t}(42)sin(42t)\right)$$

$$\epsilon = (-2.714)\left((-.00939) - (-17.46)\right) = -47.37\,V$$

2. In the diagrams below, indicate the direction that current will flow through resistor, R.

   The first two diagrams have current to the right, and the last has current going to the left.