Answers Exam 3 2013

1. a) $\oint \vec{B} \cdot d\vec{r} = \mu_0 (i_1 + i_2)$

   b) $B_x = \frac{\mu_0 i_1}{5\pi d}$; $B_y = \frac{\mu_0 i_1}{10\pi d}$

   c) $\vec{B} = B_x \vec{i}_x$

2. a) $\vec{B}_1 = 0$; $\vec{B}_2 = 0$; $B_3 = \frac{\mu_0 i}{4\pi a} \odot$; $\vec{B}_4 = \frac{\mu_0 i}{4\pi a} \otimes$

   b) $\vec{B} = 0$

3. a) $i = \frac{V}{R}$

   b) $L \frac{di}{dt} + Ri = V$

   c) $i(t) = \frac{V}{R}\left(1 - e^{-\frac{R}{L}t}\right)$

4. a) $R \frac{dQ}{dt} + \frac{1}{C} Q = -BW\cos\theta\, v_x$

   b) $Q = -CBW\cos\theta\, v_x$

   c) $\vec{F} = CB^2 W^2 \cos\theta \frac{d^2x}{dt^2}$ to the right

   d) $i = \frac{mg \sin\theta}{WB\cos\theta + \frac{m}{CBW\cos\theta}}$