11. (a) Ohm's law combines with Faraday's law to give $i = -\frac{N}{R}\frac{d\Phi_B}{dt}$ where R is the resistance of the coil. In this case, $N = 1$ (it is a single loop), and we integrate to find the charge:

$$
\begin{aligned}
\int_0^t i\,dt &= -\frac{1}{R}\int_0^t \frac{d\Phi_B}{dt}\,dt \\
q(t) &= -\frac{1}{R}\left(\Phi_B(t) - \Phi_B(0)\right)
\end{aligned}
$$

which is equivalent to the expression shown in the problem statement. We have used little more than the fundamental theorem of calculus; no particular assumptions have been made about how the integrations should be performed. The result is independent of the way $\vec{B}$ has changed.

(b) If the current is identically zero for over the whole range $0 \to t$ then certainly the left-hand side of our computation, above, gives zero. But the same result can come from the current being in one direction for, say, $0 \to \frac{t}{2}$ and then in the opposite direction for $\frac{t}{2} \to t$ in such a way that $\int_0^t i\,dt = 0$. So a vanishing integral does not necessarily mean the integrand itself is identically zero.