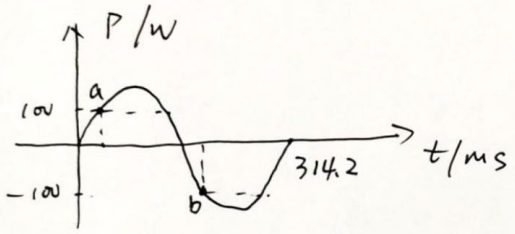
1.

$$V = L \times \frac{di}{dt} = 2 \times \frac{d(5\sin 10t)}{dt} = 100\cos 10t$$

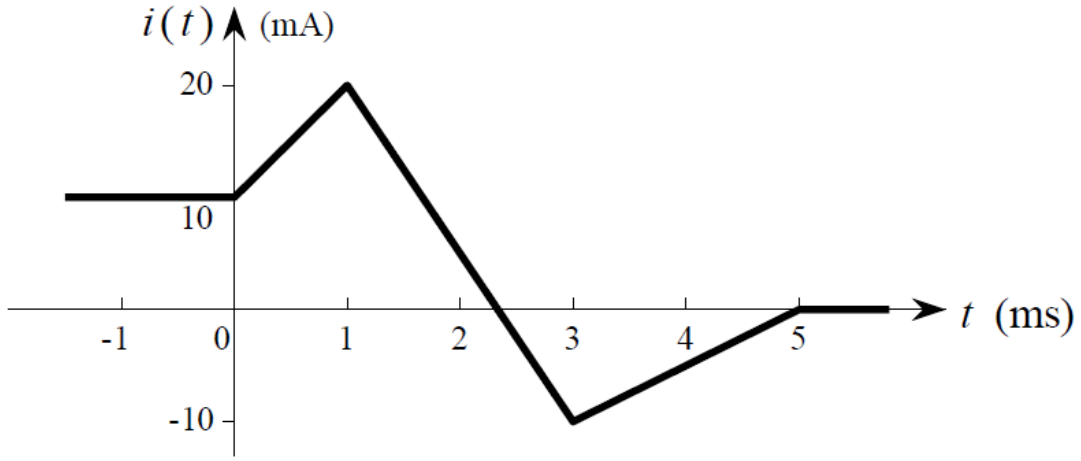
$$P = V \times i = 5\sin 10t \times 100\cos 10t = 250\sin 20t \Rightarrow T = \frac{2\pi}{20} = 314.2\ ms$$

(a) $250\sin 20t = 100 \Rightarrow t = 20.6\ ms$

(b) $250\sin 20t = -100 \Rightarrow t = 177.7\ ms$



2. The variation of current through a 25 mH inductor as a function of time is shown below, please find the voltage across the inductor.



Solution:

Since the current is constant for $t < 0$, the voltage is zero in this interval. The current then begins to increase at the linear rate $di/dt = 10\ \text{As}^{-1}$, and thus a constant voltage of $v = L\,di/dt = 250\ \text{mV}$ is produced. During the following 2 millisecond interval, the current decreases at the linear rate $di/dt = -15\ \text{As}^{-1}$, and so the voltage is $v = L\,di/dt = -375\ \text{mV}$. The final increase of the current causes a positive 125 mV and no response thereafter. The voltage waveform is sketched below: