42. (a) We note that we obtain the maximum value in Eq. 33-28 when we set

$$t = \frac{\pi}{2\omega_d} = \frac{1}{4f} = \frac{1}{4(60)} = 0.00417 \text{ s}$$

or 4.17 ms. The result is $\mathcal{E}_m \sin(\pi/2) = \mathcal{E}_m \sin(90°) = 36.0\,\text{V}$. We note, for reference in the subsequent parts, that at $t = 4.17\,\text{ms}$, the current is

$$i = I\sin(\omega_d t - \phi) = I\sin(90° - (-29.4°)) = (0.196\,\text{A})\cos(29.4°) = 0.171 \text{ A}$$

using Eq. 33-29 and the results of the Sample Problem.

(b) At $t = 4.17$ ms, Ohm's law directly gives

$$v_R = iR = (I\cos(29.4°))\, R(0.171\,\text{A})(160\,\Omega) = 27.3 \text{ V} .$$

(c) The capacitor voltage phasor is 90° less than that of the current. Thus, at $t = 4.17$ ms, we obtain

$$v_C = I\sin(90° - (-29.4°) - 90°)X_C = IX_C \sin(29.4°) = (0.196\,\text{A})(177\,\Omega)\sin(29.4°) = 17.0 \text{ V} .$$

(d) The inductor voltage phasor is 90° more than that of the current. Therefore, at $t = 4.17$ ms, we find

$$v_L = I\sin(90° - (-29.4°) + 90°)X_L = -IX_L \sin(29.4°) = -(0.196\,\text{A})(86.7\,\Omega)\sin(29.4°) = -8.3 \text{ V} .$$

(e) Our results for parts (b), (c) and (d) add to give 36.0 V, the same as the answer for part (a).