78. (a) The power delivered by the motor is $P = (2.00\,\text{V})(0.500\,\text{m/s}) = 1.00\,\text{W}$. From $P = i^2 R_{\text{motor}}$ and $\mathcal{E} = i(r + R_{\text{motor}})$ we then find $i^2 r - i\mathcal{E} + P = 0$ (which also follows directly from the conservation of energy principle). We solve for i:

$$i = \frac{\mathcal{E} \pm \sqrt{\mathcal{E}^2 - 4rP}}{2r} = \frac{2.00\,\text{V} \pm \sqrt{(2.00\,\text{V})^2 - 4(0.500\,\Omega)(1.00\,\text{W})}}{2(0.500\,\Omega)} \ .$$

The answer is either $3.41\,\text{A}$ or $0.586\,\text{A}$.

(b) We use $V = \mathcal{E} - ir = 2.00\,\text{V} - i(0.500\,\Omega)$. We substitute the two values of i obtained in part (a) into the above formula to get $V = 0.293\,\text{V}$ or $1.71\,\text{V}$.

(c) The power P delivered by the motor is the same for either solution. Since $P = iV$ we may have a lower i and higher V or, alternatively, a lower V and higher i. One can check that the two sets of solutions for i and V above do yield the same power $P = iV$.