78. (a) It follows from Eq. 2-8 that $v - v_0 = \int a\,dt$, which has the geometric interpretation of being the area under the graph. Thus, with $v_0 = 2.0$ m/s and that area amounting to 3.0 m/s (adding that of a triangle to that of a square, over the interval $0 \le t \le 2$ s), we find $v = 2.0 + 3.0 = 5.0$ m/s (which we will denote as v_2 in the next part). The information given that $x_0 = 4.0$ m is not used in this solution.

(b) During $2 < t \le 4$ s, the graph of a is a straight line with slope 1.0 m/s^3. Extrapolating, we see that the intercept of this line with the a axis is zero. Thus, with SI units understood,

$$v = v_2 + \int_{2.0}^{t} a\ d\tau = 5.0 + \int_{2.0}^{t} (1.0)\tau\, d\tau = 5.0 + \frac{(1.0)t^2 - (1.0)(2.0)^2}{2}$$

which yields $v = 3.0 + 0.50t^2$ in m/s.