82. We use $J = \int F dt = m\Delta v = mv_f$. The integral $\int F\,dt$ is estimated from the area under the curve in Fig. 10-61 as approximately $4\,\mathrm{N\cdot s}$. (If one doesn't want to "count squares" one can assume the curve to be a parabola, in which case $F = \xi(t - 3.25)(t - 0.35)$ (with t in milliseconds) will fit it once the parameter ξ is adjusted so that $F = 2200$ N when t is midway between 0.35 ms and 3.25 ms. Then the integral can be done explicitly.) Thus, the final speed of the ball is

$$v_f = \frac{J}{m} = \frac{4\,\mathrm{N\cdot s}}{0.5\,\mathrm{kg}} = 8\ \mathrm{m/s}\ .$$