Some details on Problem 4.81

For this problem, we can think about the random phenomenon as the company selling an insurance policy to a 25 year old male. The random variable we are considering is the profit made by the company on each policy. The profit is the difference between the premiums paid by the policy holder and the benefits paid out by the company. Details are given in this table:

Event	Premiums received	Benefit paid	Profit	Probability
Policy holder dies at 25	\$175	\$100,000	−\$99,825	0.00039
Policy holder dies at 26	\$350	\$100,000	−\$99,650	0.00044
Policy holder dies at 27	\$525	\$100,000	−\$99,475	0.00051
Policy holder dies at 28	\$700	\$100,000	−\$99,300	0.00057
Policy holder dies at 29	\$875	\$100,000	−\$99,125	0.00060
Policy holder lives beyond 29	\$875	\$0	\$875	0.99749

Notice that the profit is negative for the first 5 possibilities. However, these have small probabilities so the company might be okay over the long run in selling many policies of this type. To check, we compute the mean profit:

$$\begin{aligned}\mu_{\text{Profit}} &= (-\$99,825)(0.00039) + (-\$99,650)(0.00044) + (-\$99,475)(0.00051) + \\ &\qquad (-\$99,300)(0.00057) + (-\$99,125)(0.00060) + (\$875)(0.99749) \\ &= \$623.22\end{aligned}$$