- For an insurance on the joint-life status, we need to calculate $\int v^t \; {}_tp_{xy}^{00}\left(\mu_{x+t:y+t}^{01} + \mu_{x+t:y+t}^{02}\right)dt$.
- For an annuity on the joint-life status, we need to calculate $\int v^t \; {}_tp_{xy}^{00}dt$.
- For an insurance on the last survivor status, we need to calculate $\int v^t \left({}_tp_{xy}^{01}\mu_{x+t}^{13} + {}_tp_{xy}^{02}\mu_{y+t}^{23}\right)dt$.
- For an annuity on the last survivor status, we need to calculate $\int v^t \left({}_tp_{xy}^{00} + {}_tp_{xy}^{01} + {}_tp_{xy}^{02}\right)dt$.

7. Shortcuts: for last survivor whole life insurance with constant forces of mortality
   a. Calculate the EPV of the insurance in state 1. In state 1, the insurance is a single-life whole life insurance, so its EPV is $\frac{\mu^{13}}{\mu^{13}+\delta}$ times the benefit amount. $b_1 = EPV$
   b. Calculate the EPV of the insurance in state 2 which is the benefit amount times $\frac{\mu^{23}}{\mu^{23}+\delta}$. $b_2 = EPV$
   c. The EPV of the insurance is the EPV of a joint-life insurance paying b_1 upon the death of (x) and b_2 upon the death of (y). Like multiple-decrement insurances with constant forces of decrement: $\frac{b_1\mu^{01}+b_2\mu^{02}}{\mu^{01}+\mu^{02}+\delta}$
   d. The expected present value of a whole life annuity on the last survivor status can be calculated similarly. Treat EPV of the annuity in state 1 or state 2 as the benefit amount of an insurance on the join-life status that pays upon transition to the state. Then the whole life annuity on the last survivor equals a whole life annuity on the joint status plus a whole life insurance on the joint status paying the EPV of annuities in states 1 and 2.

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Contingent insurances

- An insurance on (x) if (x) dies first plus an insurance on (y) if (y) dies first is the same as an insurance on the joint status: $A_{xy}^{1} + A_{x\overset{1}{y}} = A_{xy}$
- For insurances for second deaths and the last survivor status: $A_{xy}^{2} + A_{x\overset{2}{y}} = A_{\overline{xy}}$
- All the A's in either equality may be barred, and the equalities work for term insurances as well: ${}_n\bar{A}_{xy}^{1} + {}_n\bar{A}_{x\overset{1}{y}} = {}_n\bar{A}_{xy}$
- ${}_n\bar{A}_{xy}^{2}$ is not the same as ${}_n\bar{A}_{xy:\boxed{n}}^{2}$
- $A_{xy}^{1} + A_{xy}^{2} = A_x$
- If the payments made on: 1) if (x) dies second, nothing gets paid. 2) if (x) dies first, then 1 is paid when (x) dies but is refunded when (y) dies. Therefore:

$$A_{xy}^{1} - A_{x\overset{2}{y}} = A_x - A_{\overline{xy}} = A_{xy} - A_y$$