
ICA 2002 CANCUN

Technical Basics

EVK 2000

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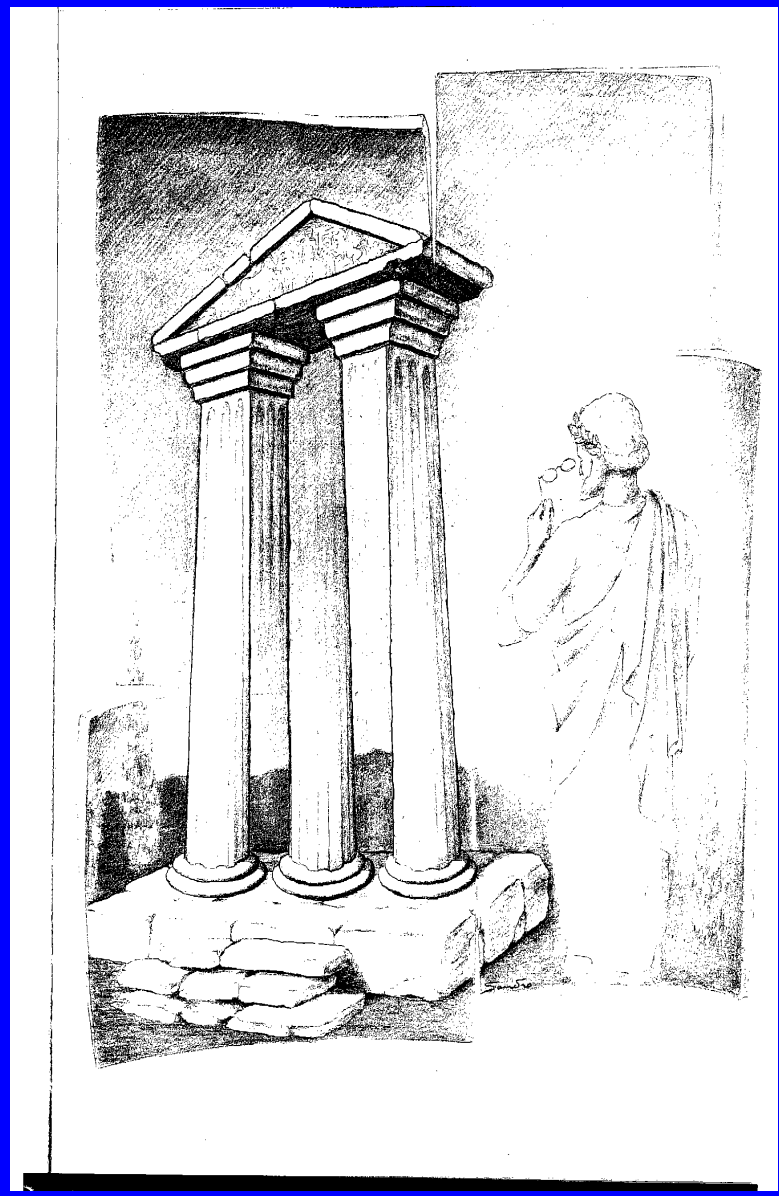
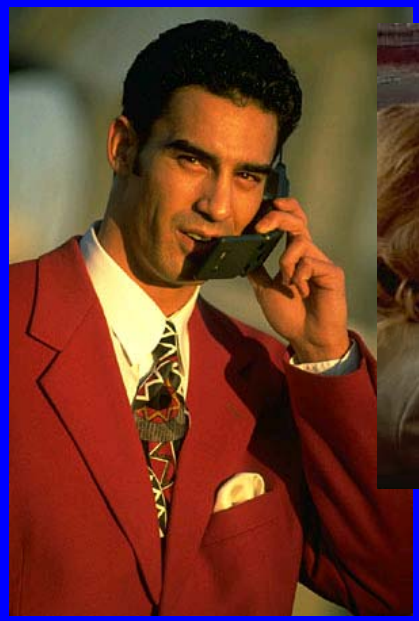


Mission to the actuary

- Structure and extent of data
- Quality of the data
- Observation period 1993-98
- Definition of the risks
- Definition of the insured events
- Definition of the tables
- Timetable

Primary groupings



Primary groupings EVK 2000

Active lives			
	Annual Risks	Deaths	%
Male	516'635	897	0.17%
Female	201'162	199	0.10%
Total	717'797	1'096	0.15%

Primary groupings EVK 2000

Active lives			
	Annual Risks	Disability	%
Male	516'635	2'682	0.52%
Female	201'162	1'111	0.55%
Total	717'797	3'793	0.53%

Primary groupings EVK 2000

Disability + Retirement Pensions			
	Annual Risks	Deaths	%
Male	151'103	6'460	4.28%
Female	30'594	1'075	3.51%
Total	181'697	7'535	4.15%

Primary groupings EVK 2000

Dependents			
	Annual Risks	Deaths	%
Widower	651	26	3.99
Widow	80'771	3‘473	4.30

Derivation of the risk groups

Quality of the data

- Formal and logical tests
- Plausibility tests
- Comparisons with other mortality tables

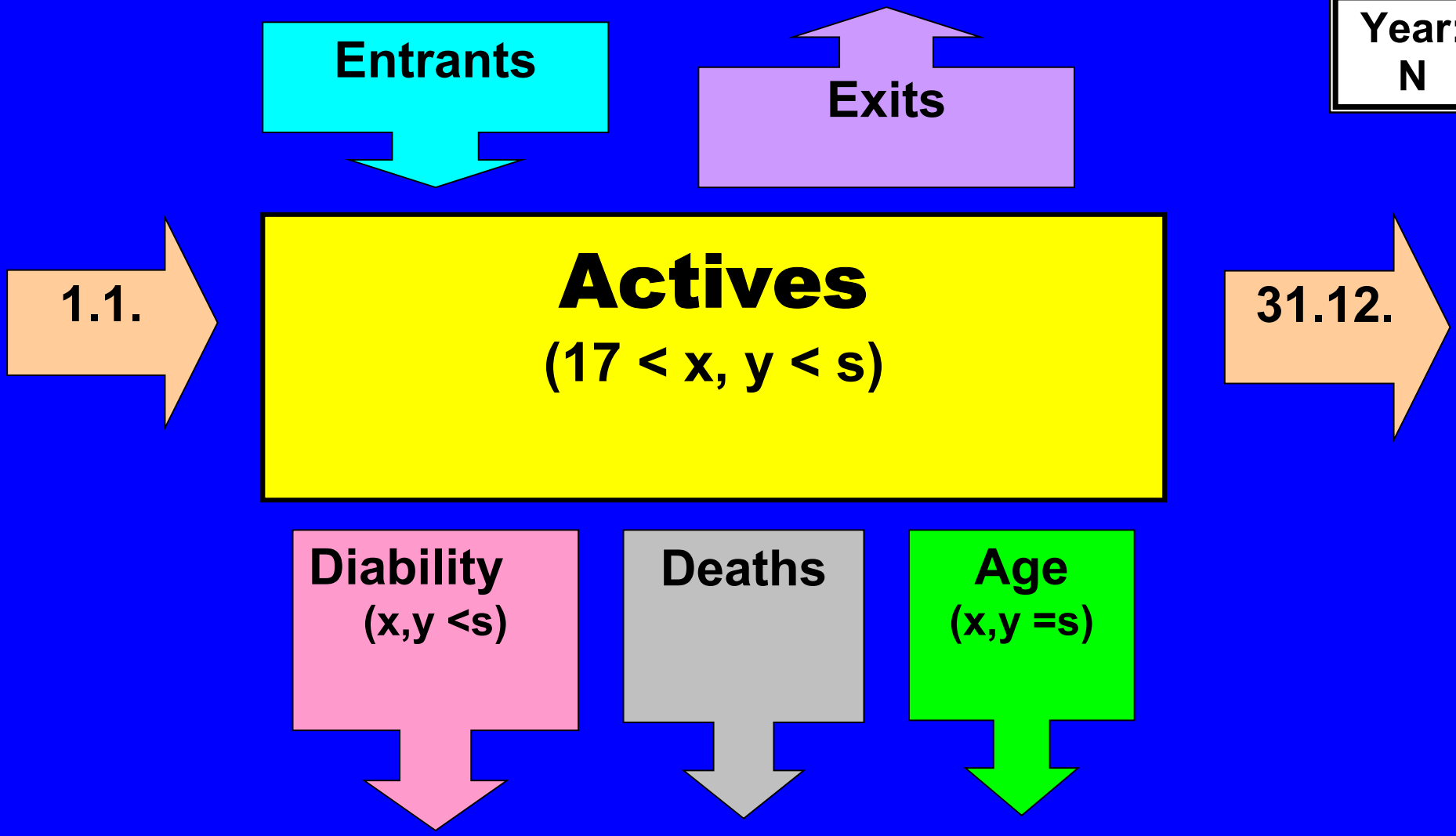
➢ Complete verification of each number

➢ Good quality of data achieved

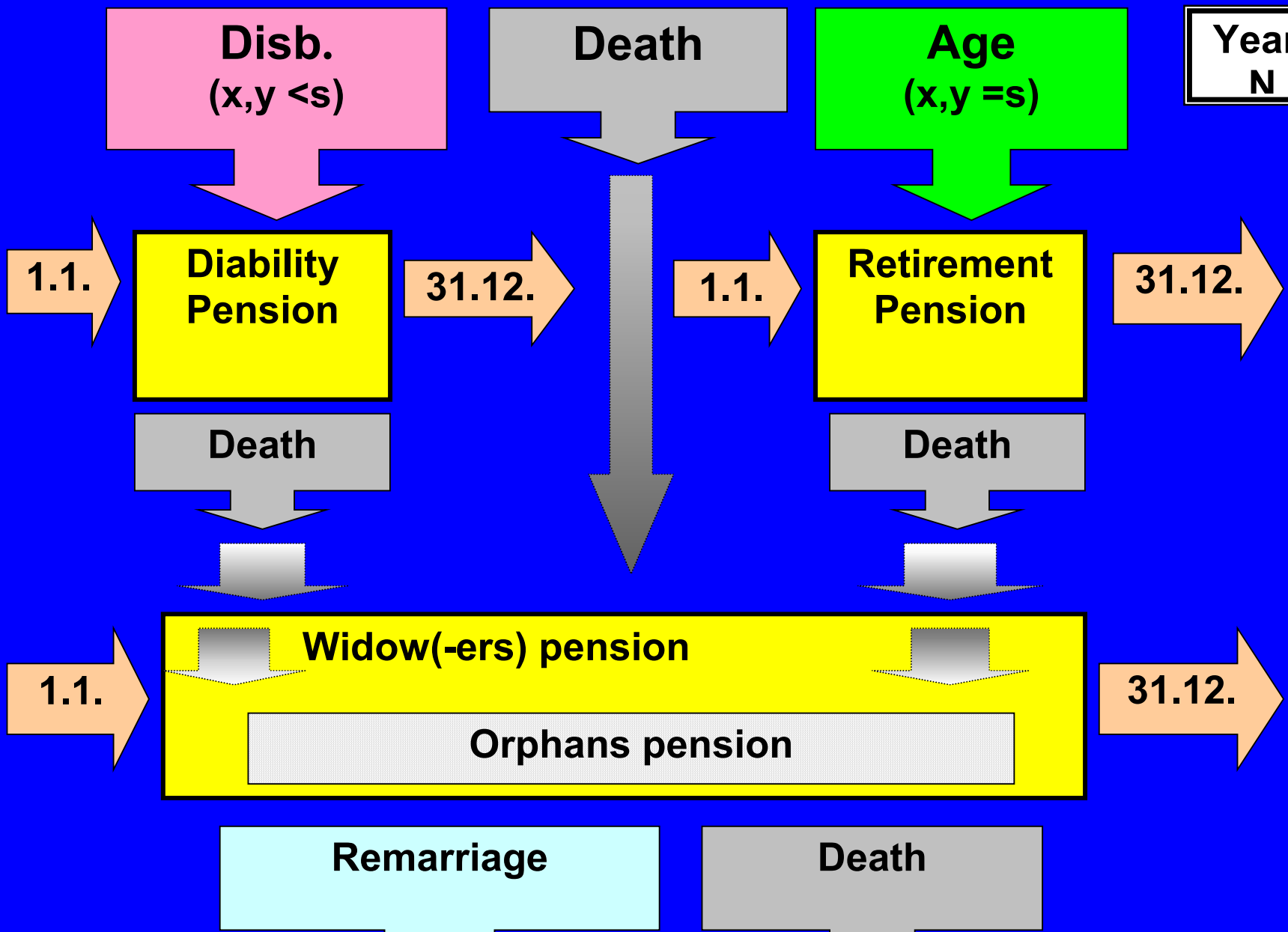
Development of the risk groups

- Degree of employment, partial disability
- Totals for active lives by year
- Totals for pensioners by year
- Calculate age and risk duration

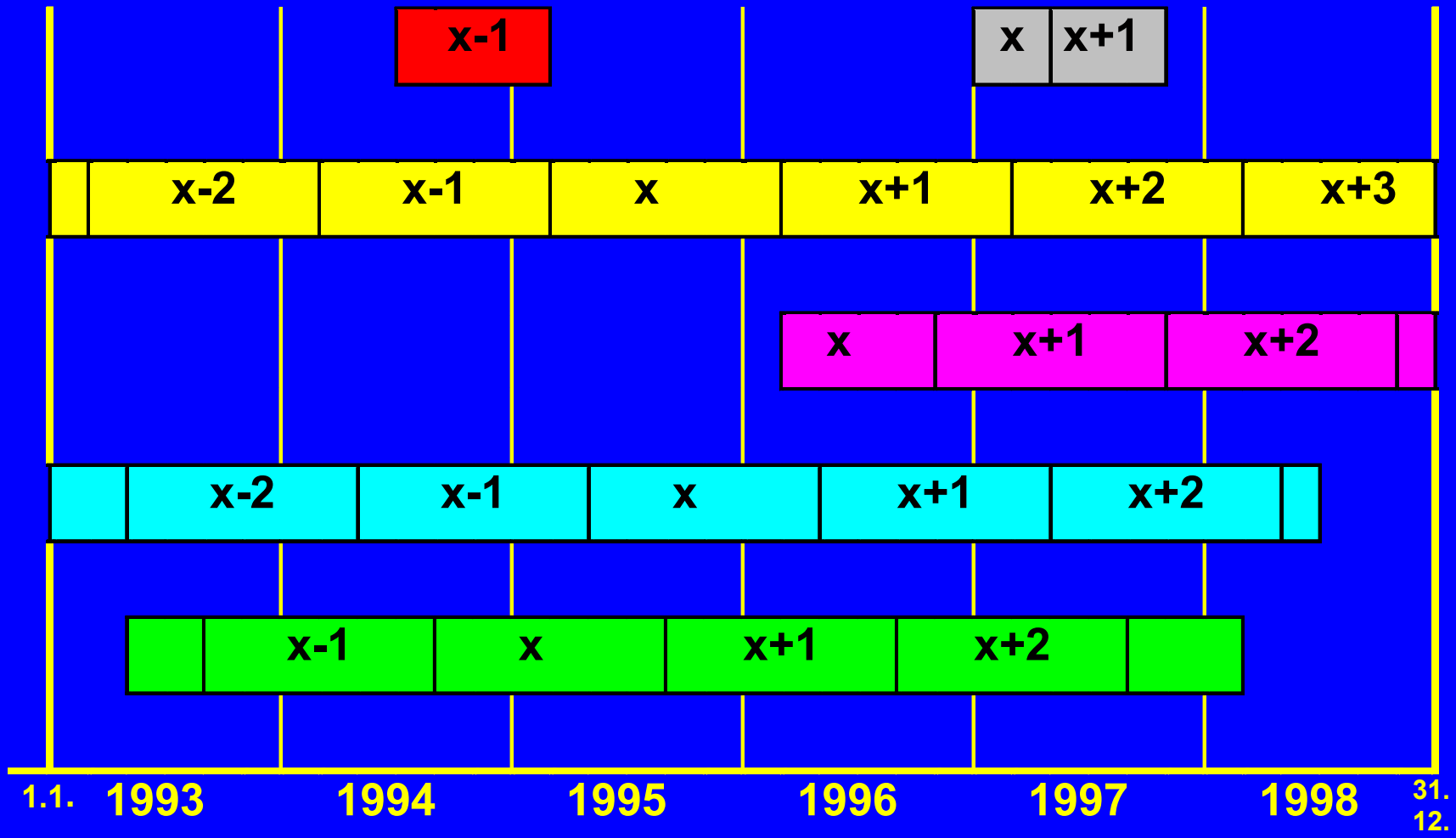
Active lives at risk



Pensioners at risk



At risk and age



Special area x,y: 55 - 65

Special area x,y: 55 - 65

- Normal retirement after age s
- Disability pension before age s
- Early pension for $n \geq n_{max}$
- Voluntary early retirement
- Compulsory early pension
- Redundancy pension (social plan)
- Partial retirement
- Lump sum benefit

Raw basic data

Example

Disability probability for males

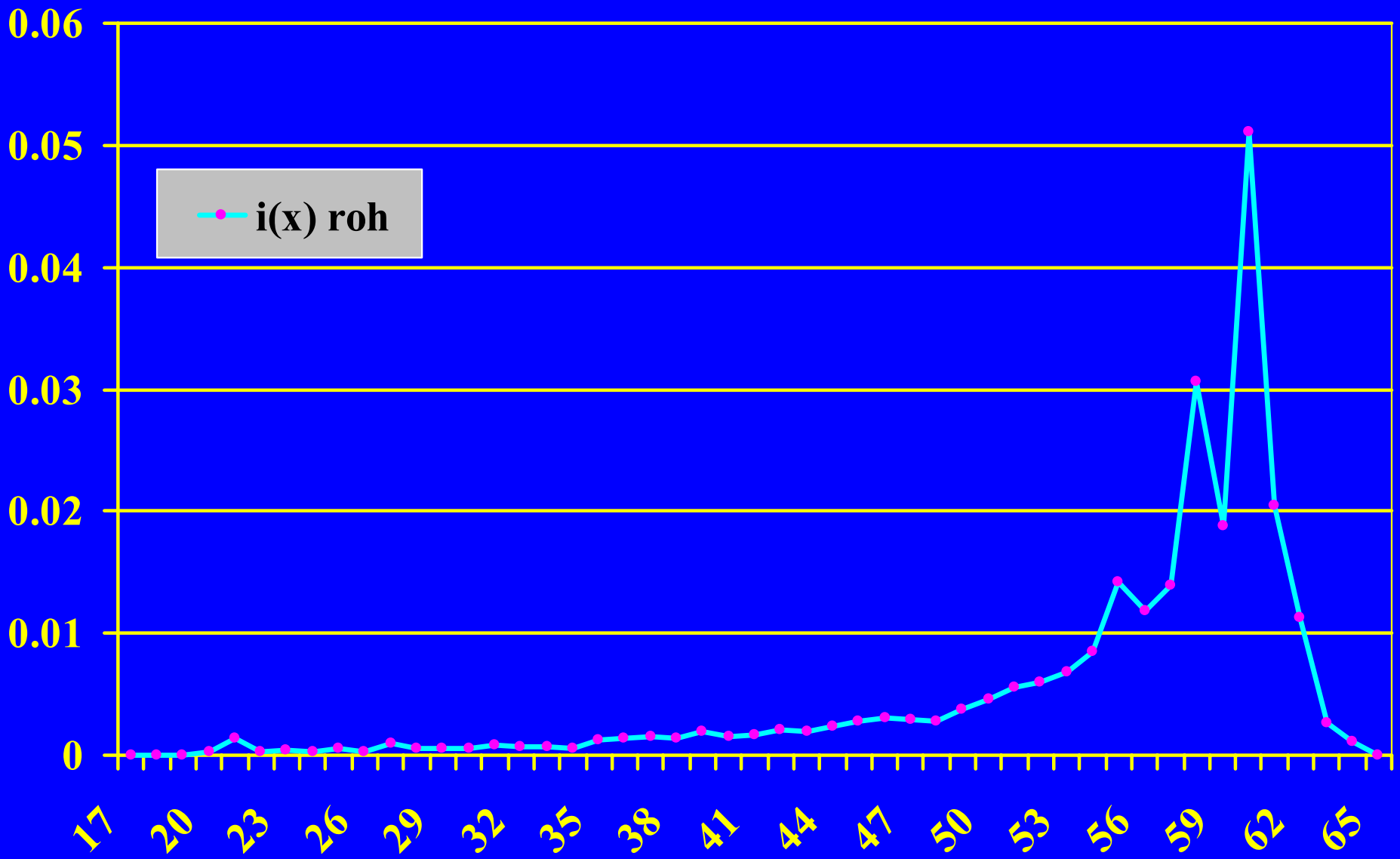
i_x

Raw data

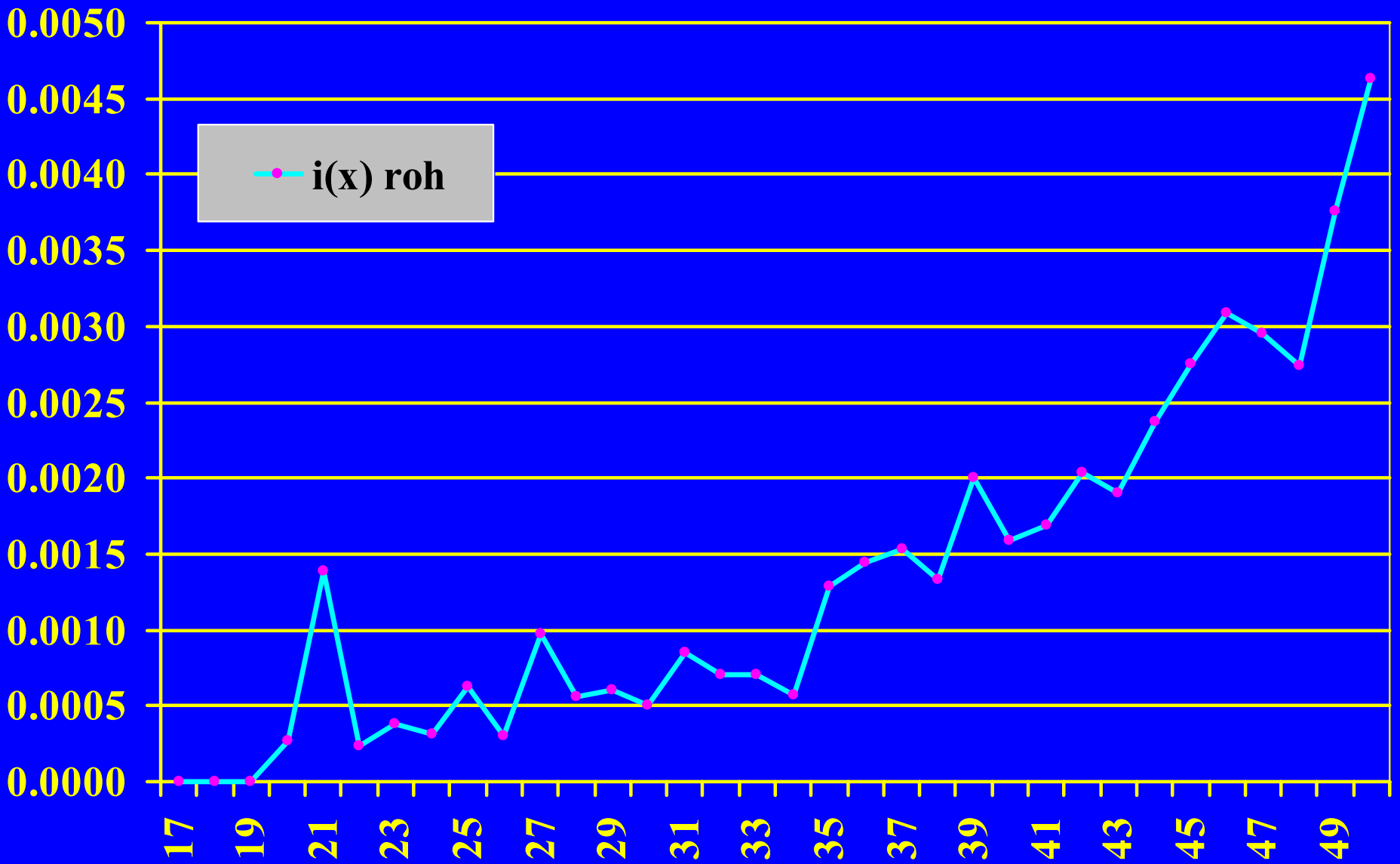
$F(x) = 1 - e^{-}$ (number of events /risks)

$i_x = 1 - e^{-}$ (Number disabled/active risks)

Disability probabilities males



Disability probabilities males



Graduation

Graduation

- Analytical method with a polynomial of degree $n \leq 6$
- Graphical smoothing at the extreme areas

General polynomial

$$F(x, 6) =$$

$$A_6 * (x-x_o + 1)^6 + A_5 * (x-x_o + 1)^5$$

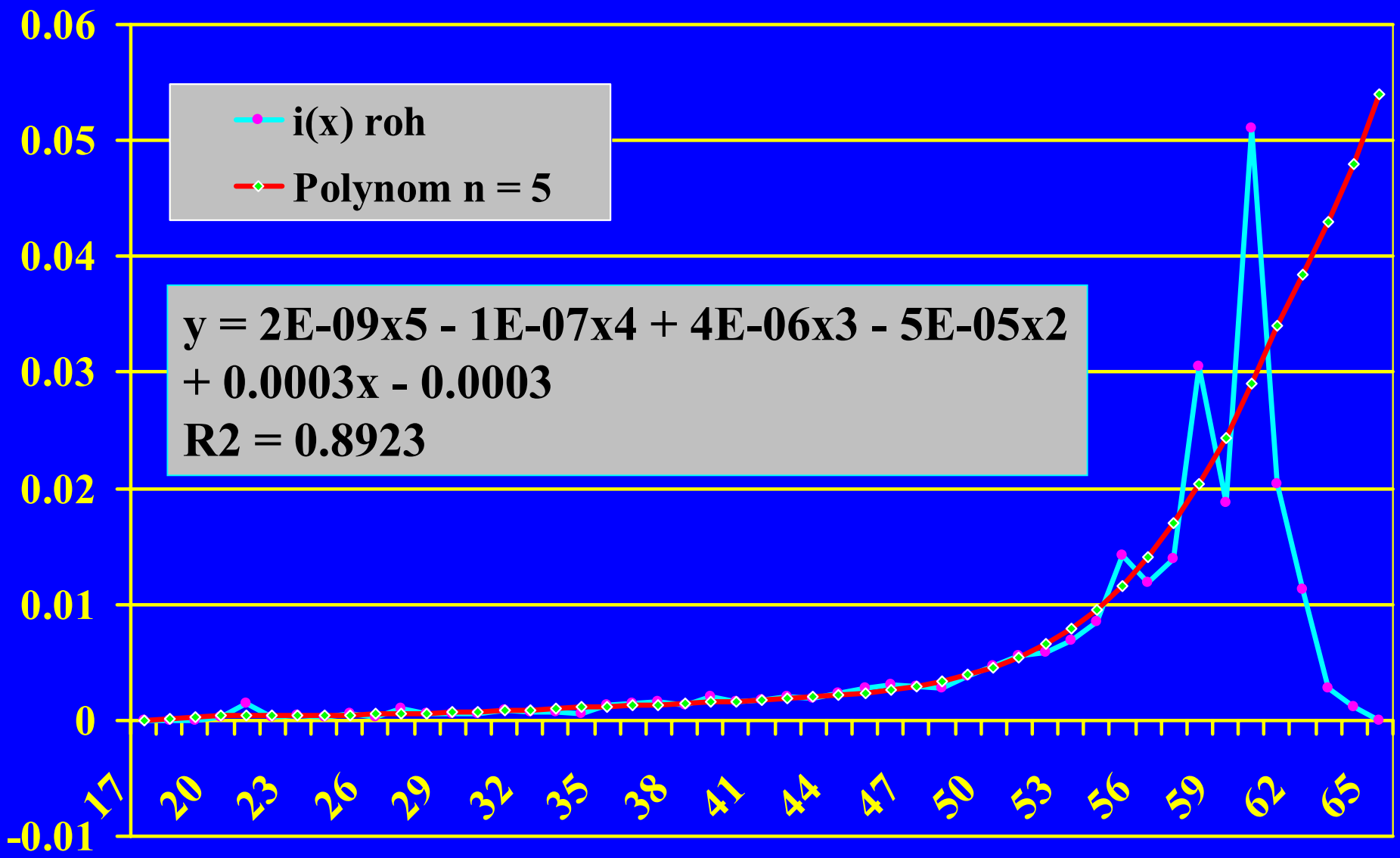
$$+ A_4 * (x-x_o + 1)^4 + A_3 * (x-x_o + 1)^3$$

$$+ A_2 * (x-x_o + 1)^2 + A_1 * (x-x_o + 1)$$

$$+ A_0$$

with $x_o = 17$

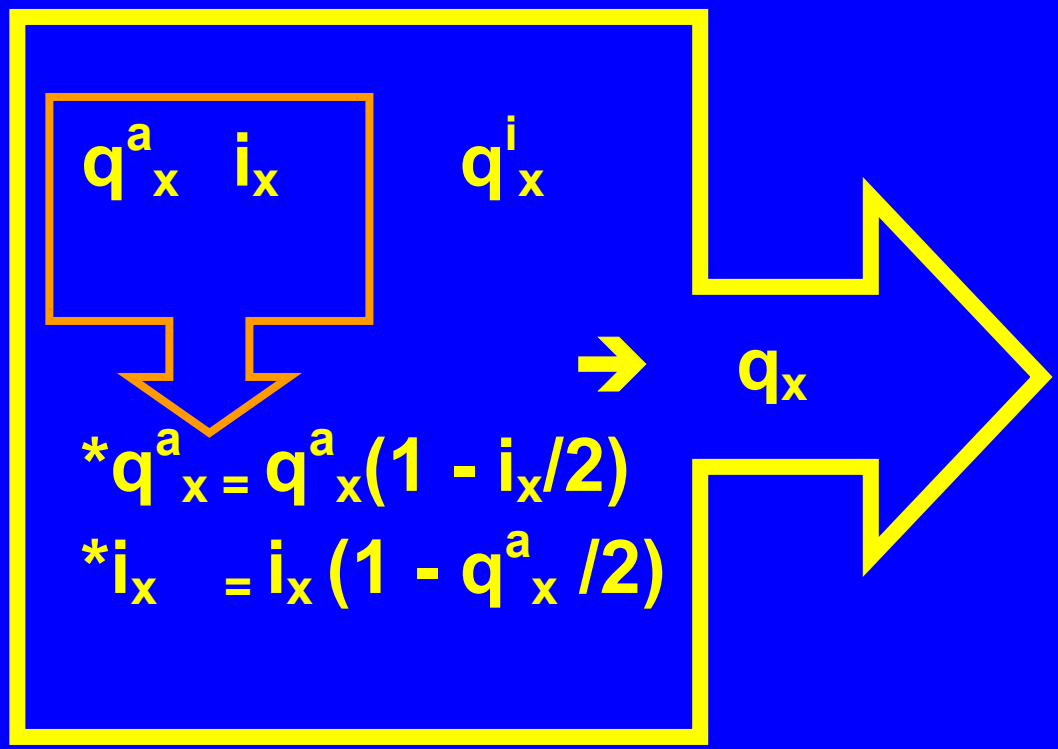
Disability probability males



Tables EVK 2000

Probability of exits

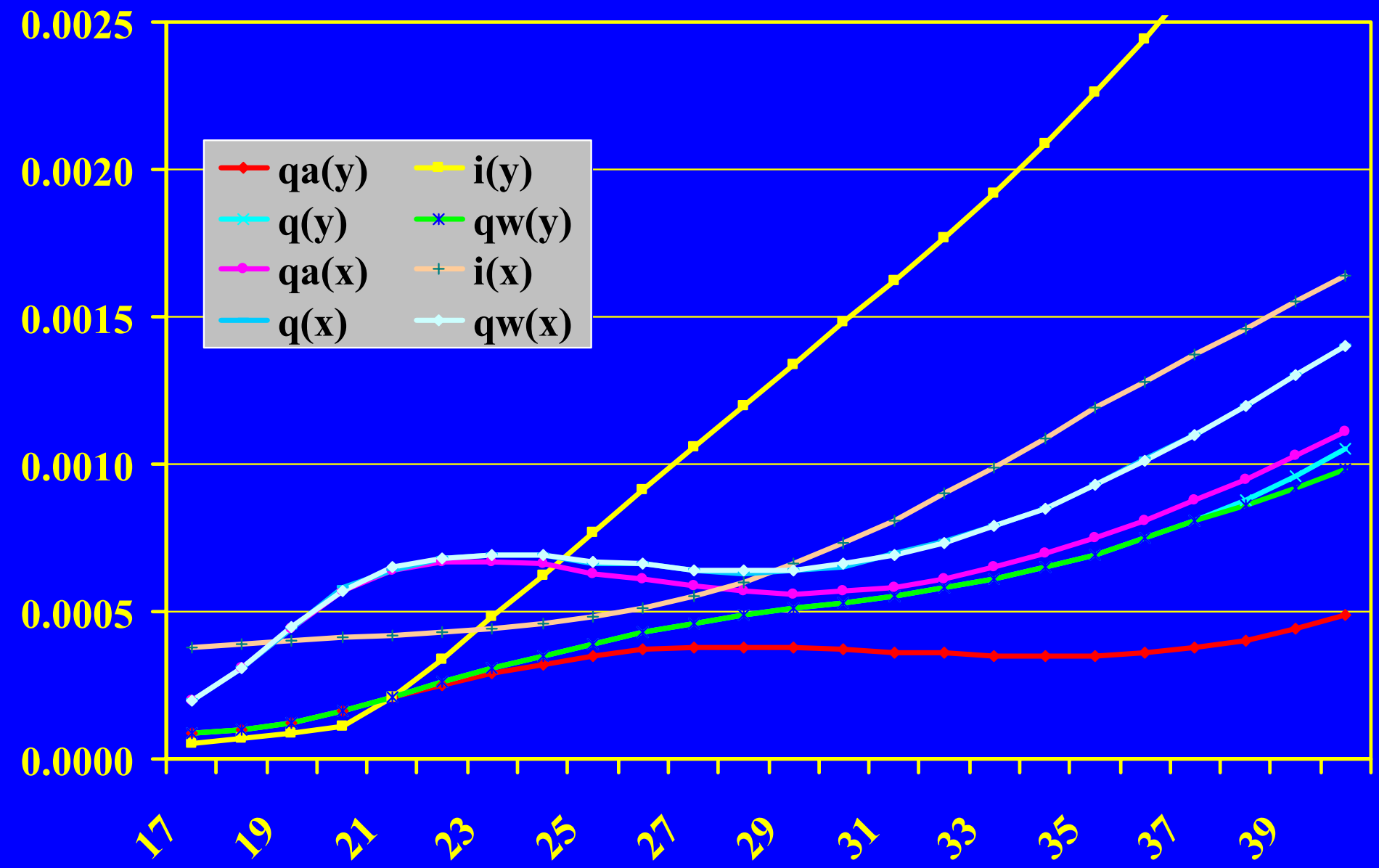
Probabilities



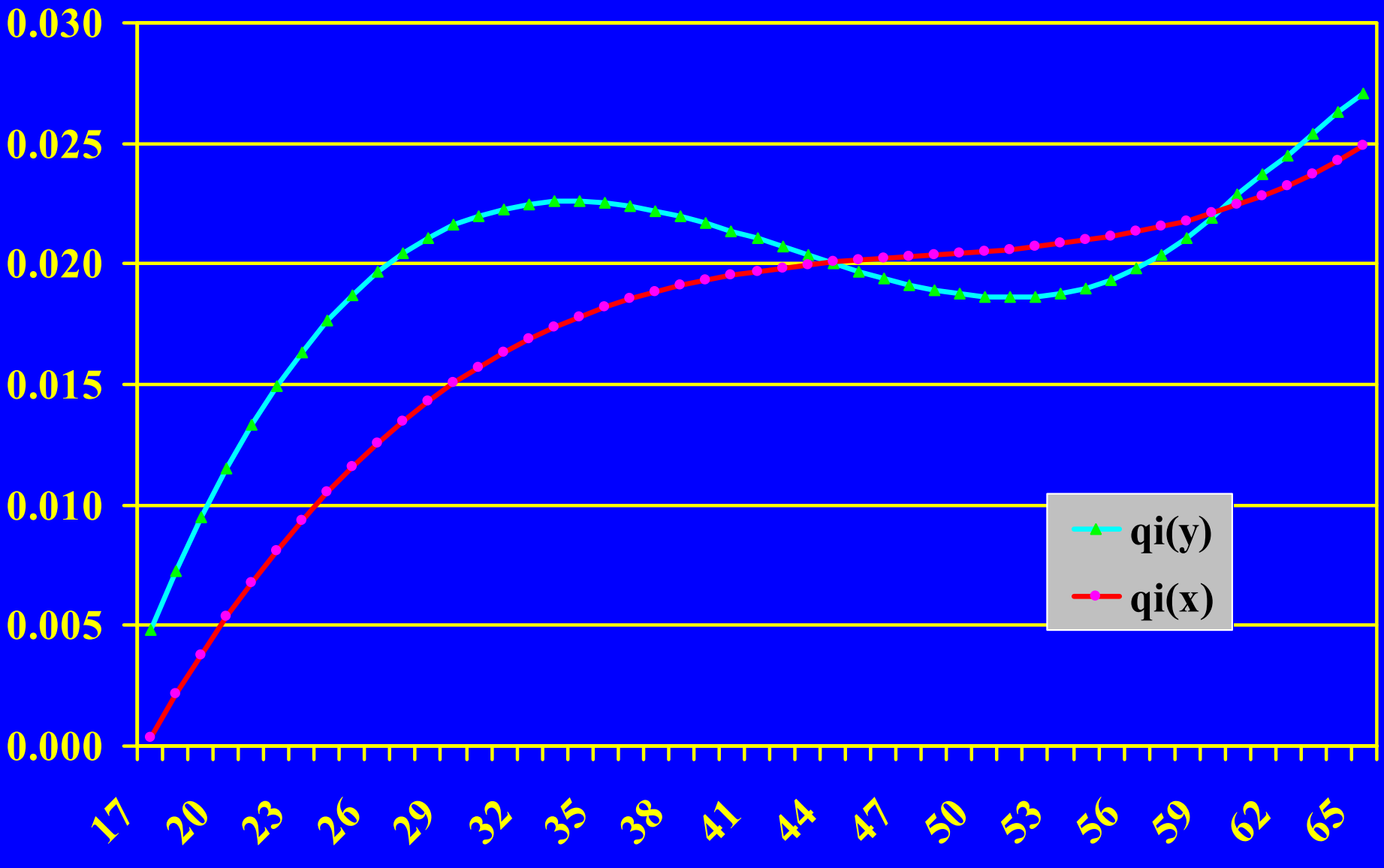
$17 \leq x \leq s$: calculated

$s < x < \omega$: graduated

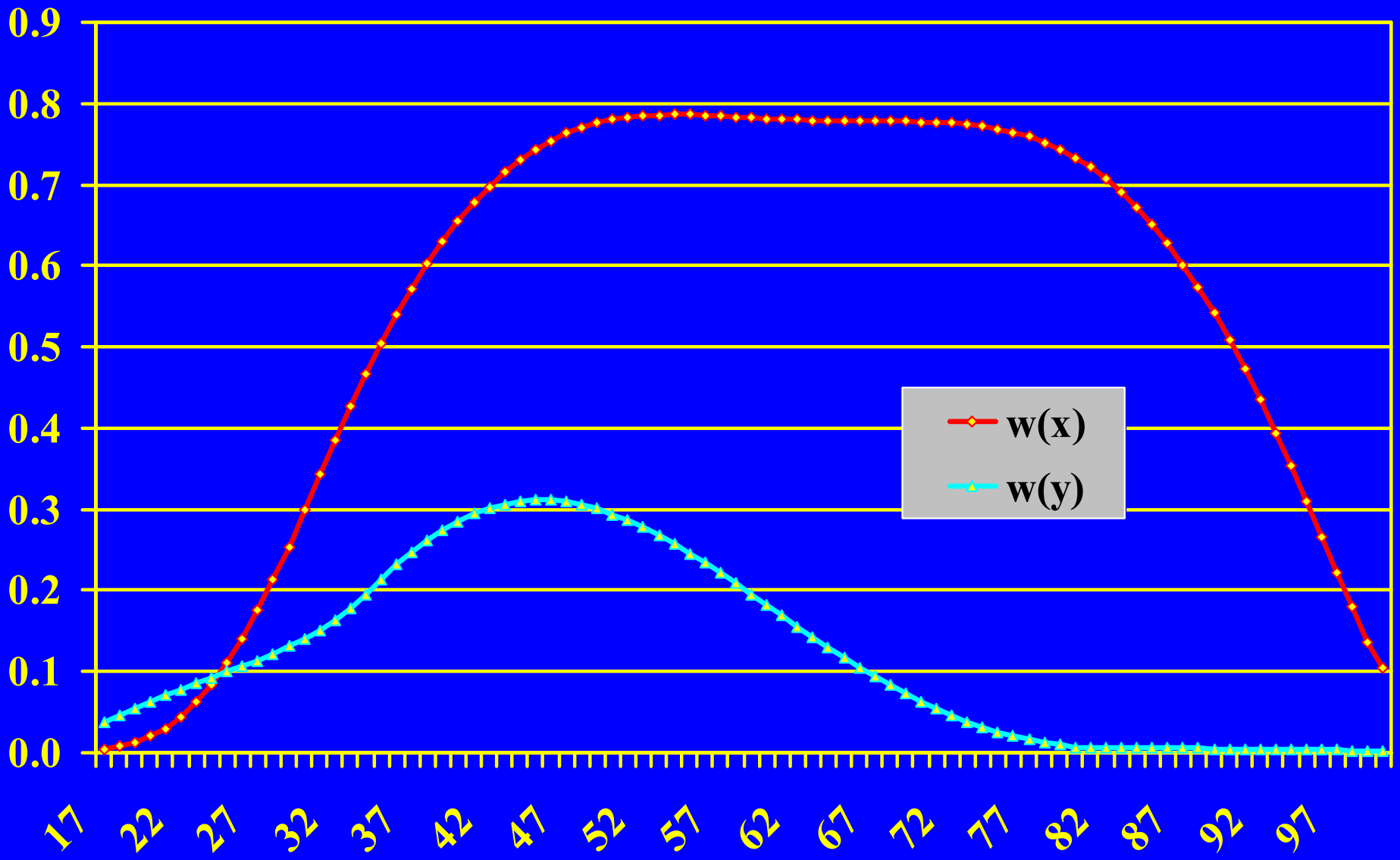
Exit probabilities



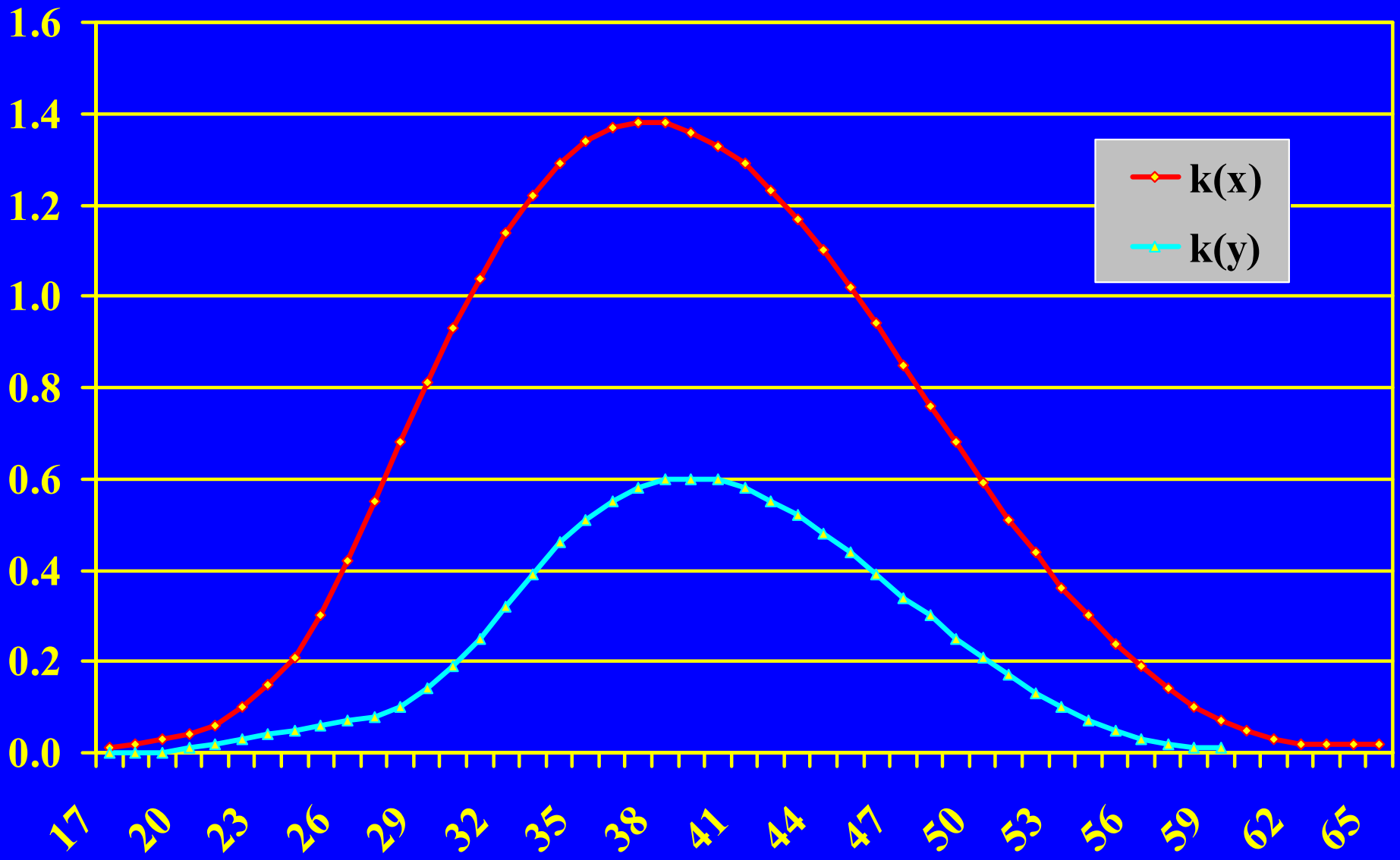
Disabled mortality



Probability to be married



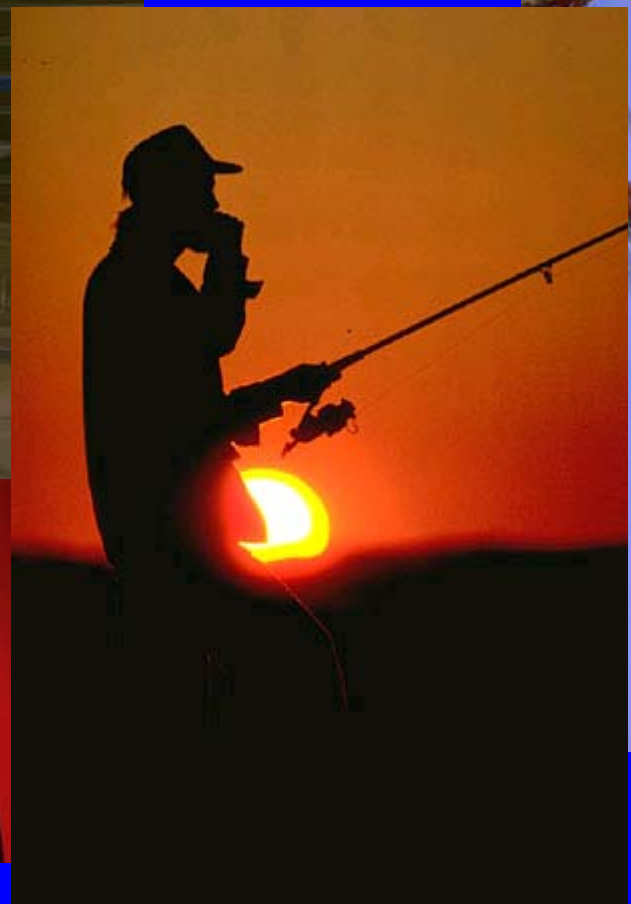
Number of children



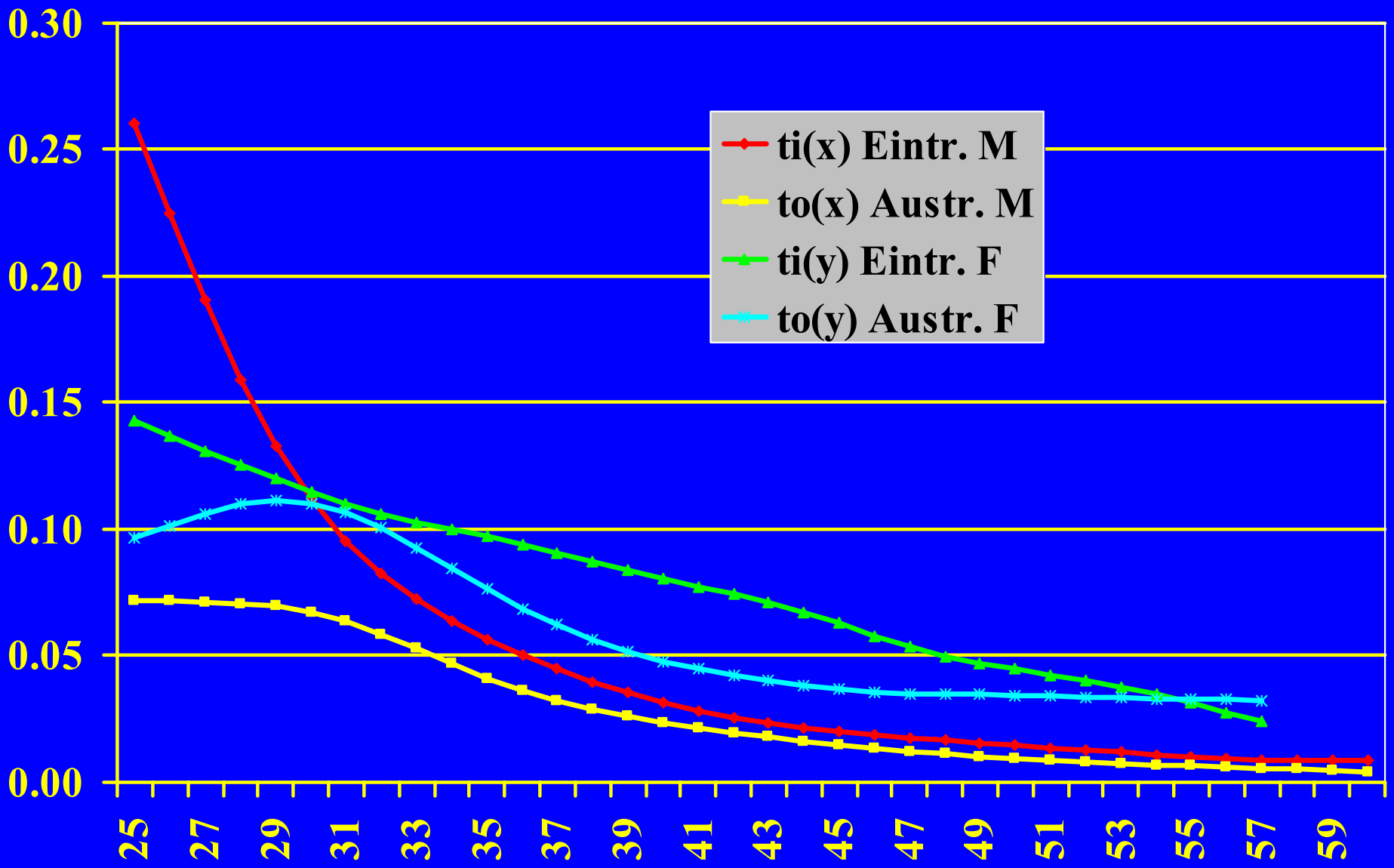
Average expectation of Life

	Male $\hat{e}_{65}$	Female $\hat{e}_{65}$	Widow $\hat{e}_{65}$
EVK 50	12.89	15.84	14.05
EVK 60	13.95	17.37	15.46
EVK 70	14.26	16.65 *)	16.65
EVK 80	15.31	19.28	18.80
EVK 90	16.55	20.92	19.90
EVK 00	17.56	20.37	21.30

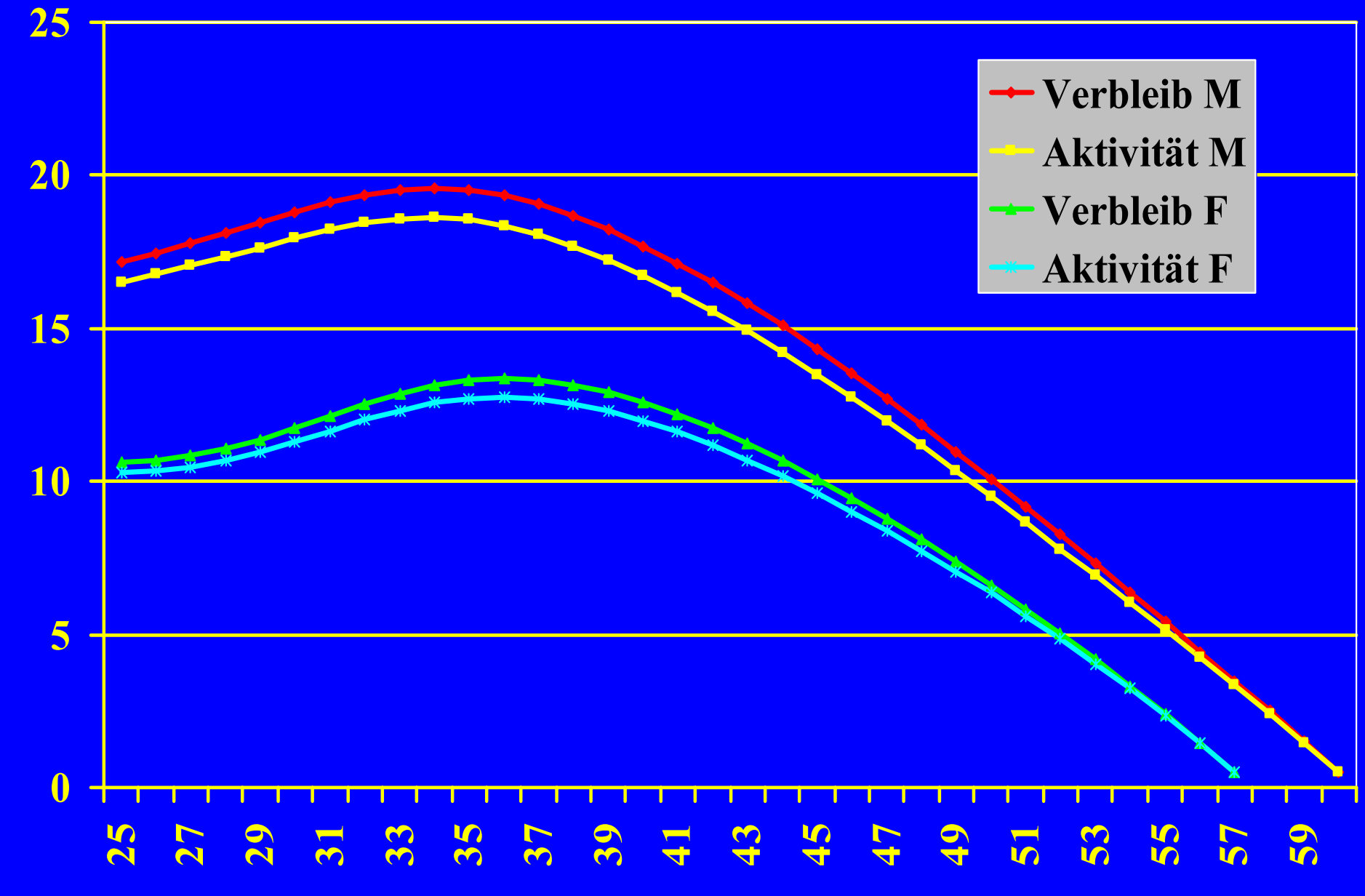
Entry rates and exit probabilities



Entry rates and exit probabilities



Lapse and total durations



Durations to lapse