

This is the definition of the force of mortality for the G82M table.

$$\begin{aligned} &> \text{m} := t \rightarrow 0.0005 + 0.00007585775 * 10^{(0.038 * t)} ; \\ &\quad m := t \rightarrow 0.0005 + 0.00007585775 \cdot 10^{(0.038 t)} \end{aligned} \quad (1)$$

This is the survival function for a life aged 30

$$\begin{aligned} &> \text{evalf}(0.00007585775 * 10^{(0.038 * 30)} / (0.038 * \ln(10))) ; \\ &\quad 0.01196742383 \end{aligned} \quad (2)$$

$$\begin{aligned} &> \text{p} := t \rightarrow \exp(-0.0005 * t - 0.01196742383 * (10^{(0.038 * t)} - 1)) ; \\ &\quad p := t \rightarrow e^{(-0.0005 t - 0.01196742383 (10^{(0.038 t)} - 1))} \end{aligned} \quad (3)$$

$$\begin{aligned} &> \text{evalf}(p(5)) ; \\ &\quad 0.9909730685 \end{aligned} \quad (4)$$

$$> \text{evalf}(p(10)) ;$$

$$0.9784941933 \quad (5)$$

$$\begin{aligned} &> \text{evalf}(p(15)) ; \\ &\quad 0.9607935017 \end{aligned} \quad (6)$$

$$\begin{aligned} &> \text{evalf}(p(20)) ; \\ &\quad 0.9352906781 \end{aligned} \quad (7)$$

$$\begin{aligned} &> \text{deq1} := \text{diff}(v(t), t) - (0.05 + m(30 + t)) * v(t) + 1 = 0 ; \\ &\quad \text{deq1} := \frac{d}{dt} v(t) - (0.0505 + 0.00007585775 \cdot 10^{(1.140 + 0.038 t)}) v(t) + 1 = 0 \end{aligned} \quad (8)$$

$$\begin{aligned} &> \text{tc1} := v(20) = 0 ; \\ &\quad \text{tc1} := v(20) = 0 \end{aligned} \quad (9)$$

$$\begin{aligned} &> \text{dsol1} := \text{dsolve}(\{\text{deq1}, \text{tc1}\}, \text{numeric}, \text{range}=0..20) ; \\ &\quad \text{dsol1} := \text{proc}(x_rkf45) \dots \text{end proc} \end{aligned} \quad (10)$$

$$\begin{aligned} &> \text{dsol1}(0) ; \\ &\quad [t=0., v(t)=12.3889075144987278] \end{aligned} \quad (11)$$

$$\begin{aligned} &> \text{dsol1}(5) ; \\ &\quad [t=5., v(t)=10.3438006849683788] \end{aligned} \quad (12)$$

$$\begin{aligned} &> \text{dsol1}(10) ; \\ &\quad [t=10., v(t)=7.73081714751068105] \end{aligned} \quad (13)$$

$$\begin{aligned} &> \text{dsol1}(15) ; \\ &\quad [t=15., v(t)=4.37131393251771172] \end{aligned} \quad (14)$$

$$\begin{aligned} &> \text{dsol1}(20) ; \\ &\quad [t=20., v(t)=0.] \end{aligned} \quad (15)$$

$$\begin{aligned} &> \text{deq2} := \text{diff}(v(t), t) - (0.06 + m(30 + t)) * v(t) + 1 = 0 ; \\ &\quad \text{deq2} := \frac{d}{dt} v(t) - (0.0605 + 0.00007585775 \cdot 10^{(1.140 + 0.038 t)}) v(t) + 1 = 0 \end{aligned} \quad (16)$$

$$> \text{tc2} := v(20) = 0 ;$$

$tc2 := v(20) = 0$ (17)

> dsol2 := dsolve({deg2,tc2}, numeric, range=0..20);
 $dsol2 := \text{proc}(x_rkf45) \dots \text{end proc}$ (18)

> dsol2(0);
 $[t = 0., v(t) = 11.4240642392023588]$ (19)

> dsol2(5);
 $[t = 5., v(t) = 9.70112853949240339]$ (20)

> dsol2(10);
 $[t = 10., v(t) = 7.39005505835992604]$ (21)

> dsol2(15);
 $[t = 15., v(t) = 4.26874054712076224]$ (22)

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