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

```
>  m := t ->
  0.0005+0.00007585775*10^(0.038*t) ;
```

$$m := t \rightarrow 0.0005 + 0.00007585775\ 10^{(0.038\ t)}$$

We calculate its value at the age of 30, to check if it agrees with the table.

```
> evalf(m(30));
```

$$0.001547128445$$

This is the survival function for a life aged 30 (please prove by integrating)

```
> evalf(0.00007585775*10^(0.038*30)/(0.038*ln
  (10)));
```

$$0.01196742383$$

```
> p := t ->
  exp(-0.0005*t-0.01196742383*(10^(0.038*t)-1
  ));
```

$$p := t \rightarrow \mathbf{e}^{(-0.0005\ t - 0.01196742383\ (10^{(0.038\ t)} - 1))}$$

We check if it makes sense. We calculate the two year survival probability.

```
> evalf(p(2));
```

$$0.9967167276$$

This is the expected remaining lifetime for a life aged 30

```
> evalf( Int( p(t), t=0..90 ));
```

$$44.11117401$$

Alternatively (the original formula)

```
> evalf( Int( t*m(30+t)*p(t), t=0..90 ));
```

$$44.11117399$$

This is a continuous whole life annuity for a life aged 30. The interest rate is 4%.

```
> evalf( Int( 1.04^(-t)*p(t), t=0..90 ));
```

$$20.17095880$$

```
> 20.17095880;
```

The same but the annuity is payable in advance

```
> evalf(sum(1.04^(-t)*p(t), t=0..90));
```

$$20.67435603$$

Let us now calculate a whole life assurance function

```
> evalf( Int( 1.04^(-t)*p(t)*m(30+t), t=0..90
  ));
```

$$0.2088806107$$

And check that the identity that relates the annuity and the assurance is satisfied.

```
> evalf(1-ln(1.04)*20.17095880);
```

$$0.2088806109$$

```
>
```