

#	x	y
1	1	1.0
2	2	3.07944
3	3	4.29584
4	4	5.15888
5	5	5.82831
6	6	6.37528
7	7	6.83773
8	8	7.23832
9	9	7.59167
10	10	7.90776

1 Finding function form

1.1 Mean values of x

$$\begin{aligned}
 x_n &= x_{10} = 10.000 \\
 x_{arif} &= \frac{x_1 + x_n}{2} = \frac{1.000 + 10.000}{2} = 5.500 \\
 x_{geom} &= \sqrt{x_1 * x_n} = \sqrt{1.000 * 10.000} = 3.162 \\
 x_{garm} &= \frac{2 * x_1 * x_n}{x_1 + x_n} = \frac{2 * 1.000 * 10.000}{1.000 + 10.000} = 1.818
 \end{aligned}$$

1.2 Interpolated y values for mean values of x

$$\begin{aligned}
 y_1^* &= f(x_{arif}) = f(5.500) = 6.102 \\
 y_2^* &= f(x_{geom}) = f(3.162) = 4.436 \\
 y_3^* &= f(x_{garm}) = f(1.818) = 2.701
 \end{aligned}$$

1.3 Mean values of y

$$\begin{aligned}
 y_n &= y_{10} = 7.908 \\
 y_{arif} &= \frac{y_1 + y_n}{2} = \frac{1.000 + 7.908}{2} = 4.454 \\
 y_{geom} &= \sqrt{y_1 * y_n} = \sqrt{1.000 * 7.908} = 2.812 \\
 y_{garm} &= \frac{2 * y_1 * y_n}{y_1 + y_n} = \frac{2 * 1.000 * 7.908}{1.000 + 7.908} = 1.775
 \end{aligned}$$

1.4 Choosing function form according to epsilon error

$$\begin{aligned}
\varepsilon_1 &= |y_1^* - y_{arif}| = |6.102 - 4.454| = 1.648 \\
\varepsilon_2 &= |y_1^* - y_{geom}| = |6.102 - 2.812| = 3.290 \\
\varepsilon_3 &= |y_1^* - y_{garm}| = |6.102 - 1.775| = 4.326 \\
\varepsilon_4 &= |y_2^* - y_{arif}| = |4.436 - 4.454| = 0.018 \\
\varepsilon_5 &= |y_2^* - y_{geom}| = |4.436 - 2.812| = 1.624 \\
\varepsilon_6 &= |y_3^* - y_{arif}| = |2.701 - 4.454| = 1.753 \\
\varepsilon_7 &= |y_3^* - y_{garm}| = |2.701 - 1.775| = 0.926 \\
&\Rightarrow \\
\varepsilon_{min} &= \varepsilon_4 = 0.018 \\
&\Rightarrow \\
y &\approx a + b * \log(x)
\end{aligned}$$

2 Fitting arguments

2.1 Transformation of coordinates from xOy to qOz

$$\begin{aligned}
q &= \phi(x) = \log(x) \\
z &= \psi(y) = y \\
A &= a \\
B &= b \\
z &= A + Bq
\end{aligned}$$

#	q	z
1	0.000	1.000
2	0.693	3.079
3	1.099	4.296
4	1.386	5.159
5	1.609	5.828
6	1.792	6.375
7	1.946	6.838
8	2.079	7.238
9	2.197	7.592
10	2.303	7.908

2.2 Fitting arguments for linear function in qOz

$$\begin{aligned}
B &= \frac{n * \sum_{i=1}^n q_i * z_i - \sum_{i=1}^n q_i * \sum_{i=1}^n z_i}{n * \sum_{i=1}^n q_i^2 - (\sum_{i=1}^n q_i)^2} = \frac{10 * 98.055 - 15.104 * 55.313}{10 * 27.650 - 228.143} = 3.000 \\
A &= \frac{\sum_{i=1}^n z_i - B * \sum_{i=1}^n q_i}{n} = \frac{55.313 - 3.000 * 15.104}{10} = 1.000
\end{aligned}$$

2.3 Mapping arguments back to xOy

$$\begin{aligned}a &= A = 1.000 \\b &= B = 3.000 \\y &\approx 1.000 + 3.000 * \log(x)\end{aligned}$$

