

2. (a)

x	0	1	2	3	4	5	6	7	8	9
y = % increase	1	1	2	3	4	5	7	9	12	17

$$y \approx a e^{bx}$$

$$z = \ln(y) \approx \underbrace{\ln(a)}_{\alpha_1} + \underbrace{b}_{\alpha_2} x$$

$$A \cdot \alpha \approx z$$

$$A^T A \alpha = A^T z$$

$$A = \begin{pmatrix} 1 & 0 \\ 1 & 1 \\ 1 & 2 \\ 1 & 3 \\ 1 & 4 \\ 1 & 5 \\ 1 & 6 \\ 1 & 7 \\ 1 & 8 \\ 1 & 9 \end{pmatrix}$$

$$A^T A = \begin{pmatrix} 10 & 45 \\ 45 & 285 \end{pmatrix}$$

$$A^T z = \begin{pmatrix} 14.2487 \\ 90.7087 \end{pmatrix}$$

$$\frac{1}{24}$$

$$\frac{1}{24}$$

$$\frac{1}{4}$$