



$$1. \begin{pmatrix} 1 & 2 & \dots & n \\ 1+n & & & \\ \vdots & & & \\ 1+n(n-1) & \dots & \dots & n^2 \end{pmatrix}$$

$$S = \frac{(1+n)n}{2} + 0 + n + 2n + \dots + (n-1) \cdot n$$

$$= \frac{(1+n)n}{2} + \frac{(n-1) \cdot n \cdot n}{2}$$

$$= \frac{n(n^2+1)}{2}$$

$$2. a^t b^t = b^s = e$$

$$a^t \cdot b^{t-s} = e$$

$$\begin{aligned}
3 \quad & \lim_{t \rightarrow 1^-} (1-t) \sum_{n=1}^{\infty} \left(1 - \frac{1}{1+t^n}\right) \\
&= \lim_{t \rightarrow 1^-} (1-t) \sum_{n=1}^{\infty} \sum_{m=1}^{\infty} t^{nm} \cdot (-1)^{m-1} \\
&= \lim_{t \rightarrow 1^-} (1-t) \sum_{m=1}^{\infty} (-1)^{m-1} \sum_{n=1}^{\infty} t^{nm} \\
&= \lim_{t \rightarrow 1^-} (1-t) \sum_{m=1}^{\infty} (-1)^{m-1} t^m \cdot \frac{1}{1-t^m} \\
&= \sum_{m=1}^{\infty} (-1)^{m-1} \frac{1}{m} \\
&= \ln 2
\end{aligned}$$

$$4. \quad x^9 = 1$$

$$p(x) = C_n x^n + C_{n-1} x^{n-1} + \dots + C_0 = u(x) \cdot (x-1)^k$$

