Spatio-temporal Data Analysis HW1

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Q1

(a)

Prove $E(Y) = E(\mu + LZ)$ and $V(Y) = V(\mu + LZ)$

Proof.

$$
\begin{aligned}
E(Y) &= E(\mu + LZ) \\
&= \mu + E(LZ) \\
&= \mu + LE(Z) && \text{(linearity property)} \\
&= \mu \\
V(Y) &= E([(Y - E(Y))(Y - E(Y))']) \\
&= E([(Y - \mu)(Y - \mu)']) \\
&= E([(LZ)(LZ)']) \\
&= E([LZZ'L']) \\
&= LE(ZZ')L' \\
&= LV(Z)L' \\
&= LIL' \\
&= LL' \\
&= \Sigma
\end{aligned}
$$

□

(b)

(c)

Q2

(a)

(b)

(c)

(d)