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0.1 Covariant and contravariant bases

In element form we write a vector as:

$$v = e_i v$$

The indices are raised and lowered to reflect whether the value is covariant or contravariant.

 v^i is contravariant. If the basis moves one way, it moves the other.

 \boldsymbol{e}_i is covariant. If the basis moves, it moves with it.