Problem 99

\[ X: \text{benefit paid to surgeon} \]
\[ Y: \text{benefit paid to hospital} \]

Due to increasing medical costs implies \( X^* = X + 100 \)
\[ Y^* = 1.1 \cdot Y \]

\[ V(X^* + Y^*) = V(X + 100 + 1.1 \cdot Y) \]
\[ = V(X) + (1.1)^2 \cdot V(Y) + 2 \cdot 1.1 \cdot \text{COV}(X, Y) \]
\[ = 5000 + (1.1)^2 \cdot 10,000 + 2 \cdot 2 \cdot \text{COV}(X, Y) \]

\[ V(X + Y) = V(X) + V(Y) + 2 \cdot \text{COV}(X, Y) \]
17,000 = 5000 + 10,000 + 2 \cdot \text{COV}(X, Y)
1000 = \text{COV}(X, Y)
\[ = 5000 + (1.1)^2 \cdot 10,000 + 2 \cdot 2 \cdot 1000 \]
\[ = 19,300 \]