Math 685.

Lecture 4.

HW3 #5.

$$(A-uv^T)^{-1} = A^{-1} + A^{-1}u(1-v^TA^{-1}u)^{-1}v^TA^{-1}$$

$(A-uv^T)*$ both sides

$$I = (A-uv^T)(A^{-1} + A^{-1}u(1-v^TA^{-1}u)^{-1}v^TA^{-1})$$

$$I = (A-uv^T)A^{-1}(I + u(1-v^TA^{-1}u)^{-1}v^TA^{-1})$$

$$I = (I-uv^TA^{-1})(I + u(1-v^TA^{-1}u)^{-1}v^TA^{-1})$$

$$I = I - \underset{\sim}{u}\underline{v^TA^{-1}} + \underset{\sim}{u}(1-v^TA^{-1}u)^{-1}\underline{v^TA^{-1}}$$
$$- \underset{\sim}{u}v^TA^{-1}u(1-v^TA^{-1}u)^{-1}\underline{v^TA^{-1}}$$

$$0 = \underset{\sim}{u}(-1 + (1-v^TA^{-1}u)^{-1} - v^TA^{-1}u(1-v^TA^{-1}u)^{-1})$$
$$\times \underline{v^TA^{-1}}$$

$$\underset{\sim}{u}\,(-1 + \underbrace{(1-v^TA^{-1}u)(1-v^TA^{-1}u)^{-1}}_{1})\underline{v^TA^{-1}}$$

$0 \equiv 0 \Leftarrow$ proof is done.