STA 302f 2015 Quiz 3

$P \times P$

1. (5 points) Let $\mathbf{M}$ be a symmetric positive definite matrix, so that $\mathbf{M}^{-1/2}$ exists. Prove that $\mathbf{M}^{-1/2}$ is non-negative definite.

$$a' M^{-1/2} a = a' C D^{-1/2} C' a$$

$$= a' \underset{1 \times P}{C} \underset{P \times P}{D^{-1/4}} \underset{P \times P}{D^{-1/4} C' a} = (D^{-1/4} C' a)' \underset{1 \times P}{D^{-1/4} C' a} \underset{P \times 1}{}$$

$$= \vec{\partial}' \vec{\partial} = \sum_{j=1}^{P} \partial_j^2 \geq 0$$

2. (5 points) In homework, you were asked to make up a 4×4 symmetric matrix $\mathbf{A}$ and do various calculations with R.

   (a) Write the determinant of $\mathbf{A}$ in the space below. The answer is a number from your printout.

   (b) Circle the number on your printout. Attach the *complete* printout to your quiz — just the printout for this question. Make sure your name and student number are written clearly on the printout.