1. Suppose $A$ is a square matrix, and $A^2 = A$.
   What are the possible values for $\det(A)$? Explain.

   
   
   
   
   

   From this equation, it follows that either $\det(A) = 0$ or $\det(A) = 1$.

2. Find all values of $a$ that make
   \[
   \begin{pmatrix}
   a & a & 0 \\
   a^2 & 2 & a \\
   0 & a & a
   \end{pmatrix}
   \]
   singular.

   
   
   
   
   

   From this you can see that the matrix will be singular for $a = 0$, $a = 1$ and $a = -2$. 