3.2.4) By Theorem 3.6, adding a constant multiple of one column to another doesn’t change the determinant, so the determinant of the new matrix is still -2.

3.2.8) Yes, \( \det(AB) = \det(A) \det(B) = \det(B) \det(A) = \det(BA) \). The equalities on the end follow from Theorem 3.9, while the one in the middle uses that the determinants are just real numbers.

3.2.17) By Theorem 3.9, \( \det(A^2) = \det(A)^2 \), so we have \( \det(A)^2 = \det(A) \). The solutions to this are \( \det(A) = 0 \) and \( \det(A) = 1 \). As \( A \) is nonsingular, \( \det(A) \neq 0 \), so we must have \( \det(A) = 1 \).

3.2.18) By Theorem 3.9, \( \det(A) \det(A^{-1}) = \det(AA^{-1}) = \det(I) = 1 \). Divide the ends by \( \det(A) \) to get \( \det(A^{-1}) = \frac{1}{\det(A)} \).

3.3.12) The bottom right entry is the only non-zero one in the last row, so by cofactor expansion, we get that the determinant is \( (t+1) \det \begin{pmatrix} t-1 & 0 \\ -2 & t-2 \end{pmatrix} \) = \( (t+1)(t-1)(t-2) \). This readily gives solutions of \( t = -1, t = 1, \) and \( t = 2 \).