M561 Problem Set Number 1

1. Problem 1.1
2. Problem 1.3
3. Problem 2.1
4. Problem 2.2
5. Problem 2.3
6. Problem 2.4
7. Problem 2.6
8. Compute the determinant of the Vandermonde matrix. Hint: multiply column i by $-x_1$ and add to column $i+1$ for $i = n-1, \ldots, 1$.
9. Show that the $m \times n$ matrix A has rank one if and only if

$$A = uv^*$$

Compute the range and nullspace of such a rank-one matrix.