1. Do Problem 30 from Section 7.1.

   Solution. The radius vectors of the circle are (0, 1) and (0, 1) and these vectors go to
   the vectors \((\sqrt{3}, 1)\) and \((-\frac{1}{2}, \frac{\sqrt{3}}{2})\).

2. Do Problem 31 from Section 7.1.

   Solution. A rectangular can be considered as a set
   
   \[ R = \{(x_0, y_0) + c(x_1, y_1) + d(x_2, y_2) : 0 \leq c, d \leq 1\} \]

   where \((x_0, y_0), (x_1, y_1)\) and \((x_2, y_2)\) are the vertices of the rectangular and \((x_0, y_0)\) is
   in between the other two vertices \((x_1, y_1)\) and \((x_2, y_2)\). The image \(T(R)\) of \(R\) is
   
   \[ T(R) = \{T(x_0, y_0) + cT(x_1, y_1) + dT(x_2, y_2) : 0 \leq c, d \leq 1\}, \]

   which is a parallelogram or a line (with the assumption \(T \neq 0\)). The set \(T(R)\) is a
   line iff \(T\) is not invertible.

3. Do Problem 27 from Section 7.2.

   Solution. There is a linear transformation \(S\) such that \(S(w_i) = v_i\) and \(S\) is the inverse
   of \(T\). Hence \(T\) is invertible.

4. Do Problem 32 from Section 7.2.

   Solution. False. If these \(n\) vectors are linearly dependant, there is a vector \(w\) which is
   not a linear combination of these \(n\) vectors and \(T(w)\) is not determined by \(T(v)\).

18.06 Wisdom. Get as ready as you can for the finals, by doing as many old exams as
you have time for (found on the 18.06 website under "Past Courses"). Strive to master the
concepts and techniques of Linear Algebra - you will need it, both here and beyond.