Homework 1

Color Scheme: Blue problems are graded, orange and red are not, but orange ones are considered important and of medium difficulty usually, while red ones are routine and straightforward. But any of these classes of problems may show up on quizzes or exams, so **you should know *how* to do all these problems**.

Graded	Important	Routine

Groups for this homework:

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Problems:

- Section 1.1: 9, 11, 21ab, 4b, 16, 17, 22, 23, 24, 7f
- Section 1.2: 13, 20b, 22, 6a-e, 9, 10, 11, 2, 4a
- Section 1.3: 1a, 13, 21b, 4 (compare with 1.2, problem 11), 7, 11a, 16, 20b
- Prove that the formula
$$D = \frac{|ax_0 + by_0 + c|}{\sqrt{a^2 + b^2}}$$
does indeed give the (shortest) distance between the line $ax + by + c = 0$ and a point $P = (x_0, y_0)$ in the plane. Hint: Take any point $Q = (x, y)$ on the line, and project the displacement vector $\overrightarrow{QP}$ onto the orthogonal unit vector $\mathbf{n}$ to the line.
- Prove that the formula
$$D = \frac{|ax_0 + by_0 + cz_0 + d|}{\sqrt{a^2 + b^2 + c^2}}$$
does indeed give the (shortest) distance between the plane $ax + by + cz + d = 0$ and a point $P = (x_0, y_0, z_0)$ in Euclidean 3-space.