MA 341 — Homework #4

Due Friday, October 3, in class

1. Course Notes 2.10.1.

2. Course Notes 2.10.2.

3. Course Notes 2.10.3.

4. Assume we know that the Pythagorean Theorem holds in $\mathbf{E}^2$. Use this to derive the formula $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ for the distance between the points $A = (x_1, y_1)$ and $B = (x_2, y_2)$. Hint: Consider a third point $C = (x_1, y_2)$.

5. Assume we know that two lines L_1 and L_2 with respective direction vectors (u_1, v_1) and (u_2, v_2) are perpendicular if and only if (u_2, v_2) is a nonzero multiple of $(v_1, -u_1)$. Consider any right triangle ΔABC with right angle at A. Then there is a direction vector (u, v) and numbers s and t such that $B = A + s(u, v)$ and $C = A + t(v, -u)$. Use this, together with the distance formula, to prove that the Pythagorean Theorem holds for ΔABC.