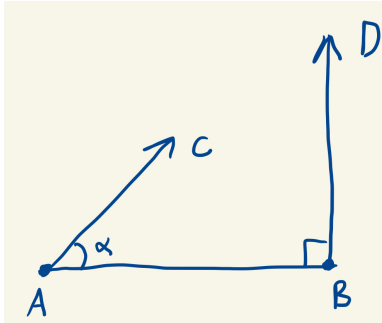


1. Prove that the exterior angles of a regular pentagon add to four right angles.
2. Deduce the opposite angles of a rhombus (a parallelogram with equal sides) are equal.
3. Here is a special case of Euclid's parallel postulate, which we will call the **right triangle axiom**.

*Given a right angle  $ABD$  and an acute angle  $\alpha = CAB$  on the same side of the line  $AB$ , the ray  $AC$  when extended will intersect the extension of ray  $BD$ .*



Show that the right triangle axiom is equivalent to Playfair's axiom. That is, show that Euclid Book I Postulates 1-4 together with the right triangle axiom imply Playfair's axiom, and that Book I Postulates 1-4 together with Playfair's axiom imply the right triangle axiom.

4. For complex numbers  $z_1 = x_1 + iy_1$  and  $z_2 = x_2 + iy_2$ , use a direct computation (without resort to polar coordinates) to show that  $|z_1 z_2| = |z_1| |z_2|$ . You will probably find it easier to show  $|z_1 z_2|^2 = |z_1|^2 |z_2|^2$ , which is fine.
5. Henle 2.10
6. Henle 2.15