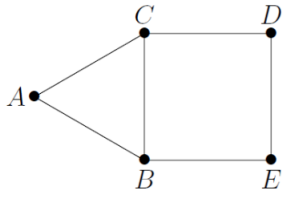
NMSU MATH PROBLEM OF THE WEEK

Solution to Problem 3

Fall 2023

Problem 3

A equilateral triangle $\triangle ABC$ is attached to a square $BCDE$ (see picture). Find the angle $\angle DAE$.



Solution: We know the angle $\angle CAB = 60^o$ because the triangle ABC is equilateral. Notice that,

$$\angle DAE = \angle BAC - \angle DAC - \angle EAB.$$

It suffices to compute $\angle DAC$ and $\angle EAB$. Now the triangle ACD is an isosceles triangle because $AC = CB = CD$. Therefore,

$$\angle DAC = \frac{1}{2}(180^o - \angle ACD)$$

The angle $\angle ACD = \angle ACB + \angle BDD = 60^o + 90^o = 150^o$. Therefore, $\angle DAC = 15^o$.

A similar argument for triangle ABE also shows that $\angle EAB = 16^o$. Therefore,

$$\angle DAE = 60^o - 15^o - 15^o = 30^o.$$