MATH 476 – College Geometry

Solutions to Homework Assignment 5

1. **Section 4.1:** 2, 10, 16

   2. $\text{m}\angle 1 = 180 - 90 - 31 = 59$,$\text{m}\angle 2 = 180 - 31 - 90 = 59$, and $\text{m}\angle 3 = 180 - 90 - 59 = 31$.

   10. (a) By the Midpoint Connector Theorem, $AL = \frac{1}{2}AB$ and $AD = \frac{1}{2}AL$, so $AD = \frac{1}{4}AB$. Similarly, $AE = \frac{1}{4}AC$. Furthermore, again by the same theorem, $LM = \frac{1}{2}BC$ and $DE = \frac{1}{2}LM$, giving $DE = \frac{1}{4}LM$, as desired.

   (b) Using the dotted-line triangle the author has helpfully drawn in for us, we see that $LD' = \frac{1}{2}LB = \frac{1}{4}AB$ and $ME' = \frac{1}{2}MC = \frac{1}{4}AC$. Thus $AD' = \frac{1}{2}AB + \frac{1}{4}AB = \frac{3}{4}AB$ and, similarly, $AE' = \frac{3}{4}AC$. Also, $D'E' = D'R + RS + SE' = \frac{1}{2}BH + \frac{1}{2}LM + \frac{1}{2}CH = \frac{3}{2}LM = \frac{3}{4}BC$.

   16. Since $\triangle ABC \cong \triangle DCE$, $\angle B \cong \angle DCE$ by CPCF. By the F property, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$. Thus, $\angle BAC \cong \angle ACD$ by the Z-property. This gives $\triangle ABC \cong \triangle CDA$ by SAS, so $\angle DAC \cong \angle BCA$ by CPCF. Now $\overleftrightarrow{AD} \parallel \overleftrightarrow{BC}$ by the Z-property.

2. **Section 4.2:** 1, 2, 3, 5, 6, 9, 12, 15

   1. See back of book.

   2. We have the following information: $x + 20 = y$ and $\frac{x}{x+20} = \frac{50}{y}$. Thus $\frac{y-20}{y} = \frac{50}{y}$, so $y = 70$. This gives $x = 50$ and $\frac{50}{20} = \frac{30}{z}$, so $z = 12$.

   3. See back of book.

   5. See back of book.

   6. Since the lines are equally spaced, they cut the sides into congruent segments. Thus $x = \frac{24}{4} = 6$ and $u = \frac{32}{4} = 8$. Also, $z = \frac{1}{2}(12 + 34) = 23, y = \frac{1}{2}(12 + 23) = 17.5$, and $w = \frac{1}{2}(23 + 34) = 28.5$.

   9. See back of book.

   12. $\frac{30}{30+y} = \frac{50}{60+y}$, so $180 + 3y = 150 + 5y$ and $y = 15$. Now $\frac{30}{15} = \frac{x}{18}$, so $x = 36$.

   15. See back of book.