MATH 436 - College Geometry: Assignment 2

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2.19. Define the midpoint or bisector of a line segment.
The midpoint of $\overline{AB}$ is the point C such that $A - C - B$ and $\overline{AC} = \overline{CB}$. The bisector is a line that goes through C.

2.20. Define the bisector of an angle.
The bisector of $\angle AOC$ is $\overrightarrow{OB}$ such that $\angle AOB = \angle BOC$.

2.21. Let a, b and c be positive real numbers with $a < b < c$.

a. Prove that there exists $k \in \mathbb{N}$ so that $2^k a > b$.

Proof. Let $n = 2^k$. For $k \in \mathbb{N}$, it is clear that $n \in \mathbb{N}$, so, by postulate 10, $\exists n$ such that $a > b$. □

b. Prove that there exists $m \in \mathbb{N}$ so that $\frac{c}{2^m} < b$.

Proof. $\exists m$ such that $2^m b > c$ by exercise 2.21.a. Dividing both sides by 2^m, we see that $\frac{c}{2^m} < b$. □

2.23. Define diameter and semicircle.
A diameter $\overline{AB}$ of $\circ O$ with radius $\overline{OB}$ is a line segment with O as its midpoint and with twice the length of $\overline{OB}$. A semicircle is the set of points of $\circ O$ that lay on the same side of AB.

2.25. Define obtuse angle and acute angle.
$\angle AOB$ is obtuse if it is greater than a right angle. $\angle AOB$ is acute if it is less than a right angle.

2.26. Define what it means for two angles to be adjacent and what it means for two angels to be vertical.
Two angles are adjacent if they share a ray. $\angle AOC$ and $\angle BOD$ are opposite if $A - O - B$ and $C - O - D$, or if $A - O - D$ and $C - O - B$.

2.28. Define right triangle, acute triangle, and obtuse triangle.
$\triangle ABC$ is a right, acute, or obtuse triangle if it contains a right, acute, or obtuse angle, respectively.

2.29. Define scalene and isosceles triangle.
A triangle is scalene if it has all different side lengths and all different angles. A triangle is isosceles if it has a pair of sides and angle of equal measure.

2.30 Define quadrilateral.
A quadrilateral is a shape with 4 sides which encloses an area. A polygon is a shape with sides that encloses an area.