Discuss academic honesty.

Def: **curve** - (informally) a set of points that a pencil can trace.
Def: A **simple curve** never intersects itself.
Def: A **closed curve** ends where it started.
Def: A **simple closed curve** never intersects itself, except to close the curve.

Jordan Curve Theorem: A simple closed curve partitions the plane into three pieces: the curve, the **interior** and the **exterior**.

Although very easy to understand, this is a difficult theorem to prove.

Example 11.7 - Determining the Interior Points of a Simple Closed Curve in the Plane.

Def: The **regions defined by the curve** are the interior and exterior of a simple closed curve.

Example 11.8 - Counting Regions in the Plane

Def: A figure is **convex** if and only if every segment $\overline{PQ}$ is contained in the figure for each pair of points P and Q in the figure.

Def: A figure is **concave (or nonconvex)** if the figure is not convex.

Def: A **polygonal curve** consists only of a union of finitely many line segments. The endpoints of the segments are called **vertices**, and the segments themselves are called the **sides** or **edges** of the polygonal curve.

Def: A **polygon** is a simple closed polygonal curve. The interior of the polygon is called a **polygonal region**. A polygon whose interior is convex is a **convex polygon**.

Common names of polygons: **triangle, quadrilateral, pentagon, hexagon, heptagon, octagon, nonagon, decagon, n-gon**

Def: The **angle of the polygon** is determined by rays along its sides with a common vertex. For a convex polygon, these angles are **interior angles**, and are found in the interior of the polygon. Replacing one of these rays with its opposite ray forms an **exterior angle**.

Two exterior angles at the same vertex are congruent (vertical angles theorem). The interior angle and either of its adjacent exterior angles are supplementary.

Theorem: In a convex n-gon, the sum of the measures of the exterior angles (one from each vertex) is $360°$. The sum of the measures of the interior angles is $(n-2)180°$.

Example 11.19: Find the measures $3x, 8x, y$ and z of the interior and exterior angles of the pentagon $PENTA$. $\big(30x = 3(180°)$, $x = 18°$, $3x = 54°$, $8x = 144°$, $y = 126°$, $z = 36°\big)$

Theorem: The sum of measures of the interior angles of *any* n-gon is $(n-2)180°$.

Example 11.10: What is the measure of the angle at each vertex of the star? $\big(20x = 8(180) = 1440°$, $x = 72°$, $3x = 216°\big)$

Theorem: The total turn around any closed curve is an integral multiple of $360°$.
Remember that counterclockwise is positive rotation.

Example 11.11: Finding total turns

Classification of triangles: **acute, right, obtuse** and **scalene, isosceles, equilateral**

Example 11.12: Classifying triangles

Classification of quadrilaterals: **kite, trapezoid, isosceles trapezoid, parallelogram, rhombus, rectangle, square**

Def: An **equilateral** polygon has all sides the same length. An **equiangular** polygon is a convex polygon with all interior angles congruent. A **regular** polygon is both equilateral and equiangular.

Def: In a regular n-gon, the **central angle** is any angle with vertex at the center of the polygon, and sides containing adjacent vertices.

Theorem: In a regular n-gon, each interior angle has measure $(n-2)\cdot 180°/n$; each exterior angle has measure $360°/n$; each central angle has measure $360°/n$.

Since interior angles are supplementary to exterior angles, we can rewrite the measure of each interior angle in the preceding theorem as 180°- $360°/n$.

Example 11.14: Given a regular polygon with 9 sides, what is the measure of an interior angle, a central angle? $\big($Interior: $7(180°)/9 = 140°$, Central: $360°/9 = 40°\big)$
Given a regular polygon with interior angle measure of 160°, how many sides does it have?
$\big(180° - 360°/n = 160°$, $(20°)n = 360°$, $n = 18\big)$

Def: A **circle** is the set of all points which are a fixed distance (the **radius**) away from a given point (the **center**). A **chord** is any segment connecting two points on the circle. A **diameter** is a chord through the center (diameter also refers to the length of that chord). A **radius** of the circle is a segment from the center of the circle to any point on it (radius also refers to the length of that segment). A **tangent line** is a line which touches the circle at a single point, and is perpendicular to the radius of the circle at that point. An **arc** is a piece of the circle connecting two points on the circle. A **disc** is the interior of a circle. A **sector** of the circle is the part of the disc contained between two radii of the circle. A **segment** of the circle is the part of the disc contained between a chord and the circle.

Homework 5 (due 3/9/10):

- Section 11.1 #1, 4, 11, 15, 17, 21, 45
- Section 11.2 #1, 4, 6, 7, 16, 17, 18, 20, 22