G302 Class Notes – Angular Measurement

I. **Angular Measurement**
   a. Angular Measurement (based on circle)
      i. Full Circle = 360 degrees
         1. 1 degree = 1/360 th of circle

         (1) Subdivisions of Degree
             (a) 1 degree = 60 minutes
             (b) 1 minute = 60 seconds
             (c) 1 degree = 60 min x 60 sec/min = 3600 sec

         (2) Famous Angular Measurements
             (a) Right Angle = 90 degrees
             (b) (Straight Angle) Line = 180 degrees
             (c) Circle = 360 degrees
             (d) Acute Angle < 90 degrees
             (e) Obtuse Angle: between 90-180 degrees
             (f) Complementary Angles – two angles add up to 90 degrees

Area = pi(r)^2

   2. Radians – unit of angular measurement based on the length of an arc circumscribed by a circle
      a. Circumference of Circle = $2\pi r$,
         where π = circumference of circle / radius of circle = 3.14, and r = radius of circle

      b. Circle = 360 degrees = 2π radians; 180 degrees = π radians

pi = circumference / diameter = c / 2r

Degree Measure of an Angle

Let an angle be in standard position. It is said to have the measure one **degree**, written 1°, if the angle is obtained by rotating its terminal side $\frac{1}{360}$ of a complete revolution in the positive (counterclockwise) direction. Thus, an angle obtained from one complete counterclockwise revolution has a measure of 360°; an angle obtained from half a complete counterclockwise revolution has a measure of 180°; an angle obtained from one quarter of a complete counterclockwise revolution has a measure of 90°, and so on. An angle obtained from half a complete revolution in the clockwise (negative) direction has a measure of −180°. If the terminal side is not rotated so that the initial and terminal sides coincide, then the angle has measure zero degrees, written 0°. Some angles are depicted in Figure 2.
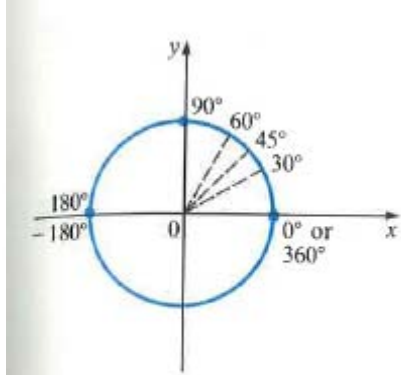

Figure 2

Some Special Angles

1. A **right angle** is an angle of 90°.
2. A **straight angle** is an angle of 180°.
3. θ is an **acute angle** if $0 < \theta < 90°$.
4. θ is an **obtuse angle** if $90° < \theta < 180°$.
5. Two acute angles, θ_1 and θ_2, are **complementary** if $\theta_1 + \theta_2 = 90°$. We say that θ_2 is the **complement** of θ_1, and vice versa.
6. Two positive angles, θ_1 and θ_2, are **supplementary** if $\theta_1 + \theta_2 = 180°$. We say that θ_2 is the **supplement** of θ_1, and vice versa.
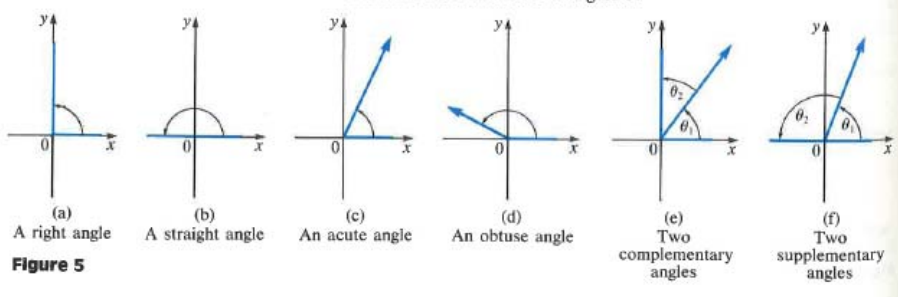
These ideas are illustrated in Figure 5.

| (a) A right angle | (b) A straight angle | (c) An acute angle | (d) An obtuse angle | (e) Two complementary angles | (f) Two supplementary angles |

Figure 5