## Workshop Problems – September 7

- 1. Let f(x) = |x |2x 4||.
  - a) What is the domain of f(x)?

b) Give a piecewise definition of f(x) without using the absolute value function. Justify your answer algebraically with a case-by-case argument from the equation for f(x). Your justification could begin with a statement such as, "For  $x \ge 2$ , the function f(x) is given by the formula ... because ...".

- c) Sketch the graph of f(x).
- 2. The graph of y = A(x) is given in Figure 1.
  - a) Find the domain and range of A.

b) If B is defined by B(x) = A(x) + 1, sketch the graph of B as well as you can. Find the domain and range of B.

c) If C is defined by C(x) = A(2x + 3), sketch the graph of C as well as you can. Find the domain and range of C.

3. The square in Figure 2 is bounded by the lines x = 1, y = 1, x = -1, y = -1. The larger circle inscribed in the square is the unit circle  $x^2 + y^2 = 1$ . Let C be the circle in the upper right hand corner, inscribed in the region bounded by the lines x = 1, y = 1, and the unit circle.

a) If r is the radius of C, find the center of C in terms of r. (Suggestion: C is tangent to the lines x = 1 and y = 1.)

b) Find the distance of the center of C to (0,0) in terms of r. (Suggestion: C is tangent to the unit circle.)

c) Find r using a) and b), or with some other method.



Figure 1: Graph of A(x)



Figure 2: Unit circle and C