Instructions: You have 25 minutes. You MUST show work for credit. If in doubt, ask for clarification.

1. (2 pts) Two angles have measures $122^\circ$ and 2.1 radians; label each in the picture and justify your answer.

\[122^\circ = 2.12 \text{ radians}, \text{ so } \alpha = 2.1 \text{ rad and } \beta = 122^\circ.\]

2. (4 pts) Here are two concentric circles of radius 5 ft and 10 ft; the two circles have the same center. An object A starts at the pictured location and is moving counterclockwise around the outer circle with an angular speed of $\omega = 1.2 \text{ rad/sec}$. Another object B starts at the pictured location and moves counterclockwise around the inner circle with an angular speed of $\omega = 60 \text{ deg/sec}$.

Find the linear speed of each object in units of feet/sec.

$v_A = 12 ft/sec, v_B = 5.24 ft/s$. 
3. (6 pts) Here are two concentric circles of radius 5 ft and 10 ft; the two circles have the same center. An object A starts at the pictured location and is moving counterclockwise around the outer circle with a linear speed of \( v = 20 \text{ ft/sec} \). Another object starts at location B and moves counterclockwise around the inner circle with the same linear speed of \( v = 20 \text{ ft/sec} \).

(a) (4 pts) Find the angular speed of each object?
\[
\omega_A = 2 \text{ rad/sec}, \quad \omega_B = 4 \text{ rad/sec}.
\]

(b) (2 pts) How long does it take each object to complete one revolution?
A takes \( \pi \) seconds; B takes \( \pi / 2 \) seconds.

4. (8 pts) Here is a graph of the function
\[
y = f(x) = (x - 1)^2 + 1
\]
on the domain \( 1 \leq x \leq 4 \).

(a) (2 pts) What is the range of \( y = f(x) \)?

General Fact:

min value \( f \leq y \leq \max \) value \( f \)

is the range. From vertex form, min value \( f=1 \) and max value \( f=10 \), since graph is increasing. So range is \( 1 \leq y \leq 10 \).

(b) (3 pts) Find a formula for the inverse function \( x = f^{-1}(y) \).
\[
x = f^{-1}(y) = 1 + \sqrt{y - 1}.
\]

(d) (3 pts) Sketch the graph of \( x = f^{-1}(y) \) below. Make sure to indicate the domain and range. domain of \( f^{-1} \) = range \( f \) computed in (a); range \( f^{-1} \) = domain \( f \) is given to us. To get graph, follow p.168 procedure.