MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 4 – JANUARY 2013
ROUND 1 ANALYTIC GEOMETRY: ANYTHING

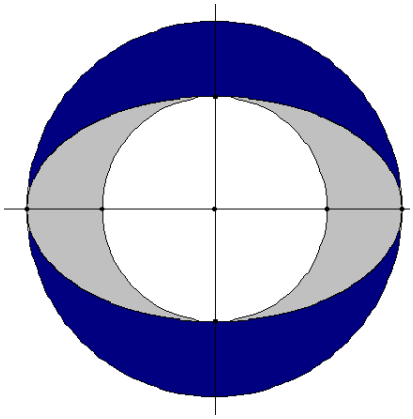
ANSWERS

A) _____ : _____

B) Center: (____ , ____) Radius: ____

C) (_____ , _____ , _____ , _____)

A) Circle C_1 is tangent to the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ at the endpoints of the minor axis.
Circle C_2 is tangent at the endpoints of the major axis.
Compute the ratio of the shaded area outside the ellipse to the shaded area inside the ellipse.



B) The ellipses $2x^2+3y^2-8x+6y-48=0$ and $3x^2+2y^2-12x+4y-52=0$ intersect in four points which lie on a circle. Find the center and radius of this circle.

C) One of the asymptotes for a hyperbola whose transverse (major) axis is parallel to the *y*-axis is $\sqrt{3}x+y=2-3\sqrt{3}$. One of its foci is at (–3, –8). The equation of a hyperbola with axes parallel to the coordinate axes may be written in the form $\frac{(y-k)^2}{a^2}-\frac{(x-h)^2}{b^2}=1$ or $\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$.
Compute the ordered quadruple $\left(a^2,b^2,h,k\right)$.