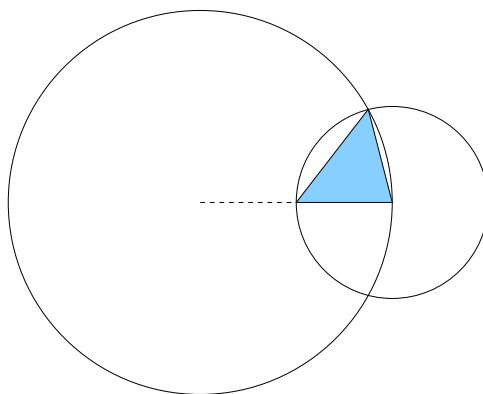# Practice Test 3

Evaluate the expression: (5 points):

- $\log_8 4 = $ _____

and do any 3 of the following problems (15 points each):

1. A circle of radius 2 passes through the center of a circle of radius 1 (see picture below). Find the area of the shaded triangle.

2. A graph $K_{k,l,m}$ has $k+l+m$ vertices divided into three sets: k vertices in one set, l vertices in another set, and m vertices in the third set. Two vertices are connected if and only if they are in different sets. Prove that $K_{1,3,5}$ has a Hamilton path but not a Hamilton cycle.

3. Find the greatest common divisor d of $a = 96$ and $b = 44$, and integer numbers x and y such that $xa + yb = d$.

4. Find a number c such that the line $y = c$ divides the region bounded by $y = 5 - x^2$ and the x-axis into two regions of equal area.

Extra credit (15 points):

- Find a curve that passes through the point $(3, 2)$ and has the property that if the tangent line is drawn at any point P on the curve, then the part of the tangent line that lies in the first quadrant is bisected by P.