



1. Rectangle $ABCD$ has side lengths $AB = 10$ and $BC = 12$. Let the midpoint of CD be point M . Compute the area of the overlap between $\triangle AMB$ and $\triangle ADC$.
2. Let ω_1 be the incircle of $\triangle ABC$ with side lengths $AB = AC = 13$ and $BC = 10$, and let ω_2 be the circle inside $\triangle ABC$ that is externally tangent to ω_1 and tangent to segments AB and AC . Compute the radius of the circle inside $\triangle ABC$ that is externally tangent to ω_1 and ω_2 and tangent to segment AB .
3. Let circles ω_1 and ω_2 be circles with radii 6 and 13, respectively, such that the distance between their centers is 25. A common external tangent touches ω_1 at point P and ω_2 at point Q . A common internal tangent touches ω_1 at point R and ω_2 at point S , and intersects line PQ at point T such that $TP < TQ$. Compute the length of segment TR .