## Advanced Challenge Level 2 Problem #22 _____

**Consider the situation described as follows.**

**Function f is defined by the equation $f(x) = 1/x^2$. Line s is the line tangent to the graph of f at the point $P(w, 1/w^2)$. Point Q is the perpendicular projection of point P into the x-axis. In other words, point Q has coordinates (w, 0). Point R, with coordinates (k, 0), is the point where line s intersects the x-axis.**

**Answer the following. Make sure you show your entire process neatly organized.**

1. **Graph f.**
2. **Find the value of k when w = 3.**
3. **Express k in terms of w, if w > 0.**
4. **Suppose that w is increasing at a constant rate of 7 units per second. How fast is k changing the instant that w = 5?**
5. **How fast is the area of triangle PQR changing at the same instant?**