1. From *Calculus for the Life Sciences* by Greenwell, Ritchey and Lial; Example 5. Blood flows faster the closer it is to the center of a blood vessel because of the reduced friction with cell walls. According to Poiseuille’s laws, the velocity $V$ of blood is given by

$$V = k(R^2 - r^2),$$

where $R$ is the radius of the blood vessel, $r$ is the distance of a layer of blood flow from the center of the vessel, and $k$ is a constant, assumed here to equal 375. Suppose a skier’s blood vessel has radius $R = 0.08$ millimeter and that cold weather is causing the vessel to contract at a rate of $dR/dt = -0.01$ millimeter per minute. How fast is the velocity of the blood changing?
Sociologists have found that crime rates are influenced by temperature. In a midwestern town of 100,000 people, the crime rate has been approximated as

\[ C = \frac{1}{10} (T - 60)^2 + 100, \]

where \( C \) is the number of crimes per month and \( T \) is the average monthly temperature in degrees Fahrenheit. The average temperature for May was 76\(^\circ\)F, and by the end of May the temperature was rising at the rate of 8\(^\circ\) per month. How fast is the crime rate rising at the end of May?