Instructions. Put your first and last name at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to show your work and explain your reasoning. All worksheets from each group will be collected.

1. Sodium chlorate crystals grow in the shape of cubes when a solution of water and sodium chlorate are allowed to evaporate slowly. If $V$ is the volume of a sodium chlorate cube with side length $x$, find $dV/dx$ for arbitrary $x$ and when $x = 3$mm. Use the correct units in your answer.

Answer: $dV/dx = 3x^2\text{mm}^3/\text{mm}$; when $x = 3$, $dV/dx = 27\text{mm}^3/\text{mm}$

2. A curve passes through the point $(0, 5)$ and has the property that the slope of the curve at every point $P = (x_0, y_0)$ is twice the $y$-coordinate $y_0$ of $P$. What is the equation of the curve?

Answer: $y = 5e^{2x}$.

3. In a murder investigation, the temperature of the corpse was 32.5 degrees C at 1:30 pm and 30.3 degrees C an hour later. Normal body temperature is 37.0 degrees C and the temperature of the surroundings was 20.0 degrees C. When did the murder take place? (Hint: use Newton’s Law of Cooling on page 240)

Answer: 11:55 am

4. How long will it take an investment to double in value if the interest rate is compounded continuously?

Answer: About 11.55 years.