**Please show ALL work!**

1. A bacteria population grows at a rate proportional to its size. Initially the population is 10,000 and after 5 days it’s 30,000.
2. What is the population after 10 days?
3. How long will it take for the population to double?
4. A solid S is generated by revolving the finite region bounded by the y-axis, the line y = 8 and the curve y = x^3 about the y-axis. Compute the volume of the solid S.
5. Suppose that the “trapezoidal rule” is used to estimate the definite integral dx.
6. Write down but do not evaluate the approximation to this integral given by the “trapezoidal rule” with *n* = 4.
7. Recall that the error satisfies ≤ K ()^3 / 12n^2 , where K satisfies ≤ K for all . How large do you need to choose *n* so that the approximation to the above integral by the “trapezoidal rule” is accurate to within 10^-6? [MUST use error formula to do this and show how to obtain the K that you use.]
8. Find the general solution for the differential equation y’ = x^4 + x^2 + 1 / y^2
9. Solve the initial value problem y’ = x^4 + x^2 + 1 / y^2 , y(0) = 2.