1. Gravel is being added to a pile at a rate of rate of $1+t^2$ tons per minute for $0 \leq t \leq 10$ minutes. If $G(t)$ is the amount of gravel (in tons) in the pile at time t, compute $G(10) - G(0)$. Then compute $G(10)$ assumeing $G(0) = 3$ tons.

2. There is a population of bacteria with 3000 cells at time $t = 0$. It grows at a rate of $1000 \cdot 5^t$ cells per hour. What is the population of the bacteria at time $t = 1$ hours?

3. Water flows from a tank at a rate of $r(t) = 3t^2 - t^3$ liters per minute from $t = 0$ to $t = 3$ minutes.

a. Compute $r(0)$, $r(1)$ and $r(3)$, and explain what these quantities mean in everyday language. Your answer should include units.

b. Compute the total amount of water that drains from the tank from time $t = 0$ to $t = 3$.

c. At what time is the rate of flow at a maximum? (Only consider t in the interval $[0, 3]$.)

4. Challenge! Compute

$$\frac{d}{dx}\int_5^{x^3} \cos(\sqrt{s})\; ds.$$

Hint: Let $H(x) = \int_5^x \cos(\sqrt{s})\; ds$. You're interested in $H(x^3)$. Apply the Chain Rule!