Problem 1: The birth rate $B(t)$, in cells per hour, of a bacteria population is given in the figure below. The curve marked $D(t)$ gives the death rate, in cells per hour, of the same population.

1. At time $t = 0$, the population has size $P_0$. Let $P(t)$ be the size of the population at time $t$. Find a formula for $P(t)$.
2. Estimate the time at which the population has a maximum.
3. Does the function $P(t)$ have inflection points?

Problem 2: Let 

$$F(x) = \int_x^{2x} e^{-t^2} dt.$$

1. Use your calculator to compute the values of $F(x)$ for $x = -2, -1, 0, 1, 2$.
2. Is the function $F(x)$ an odd function? Hint: Use the substitution $u = -t$ to check if $F(-x) = -F(x)$.
3. For what values of $x$ is $F(x)$ increasing?
4. For what values of $x$ is $F(x)$ concave up?
5. Sketch the graph of $F(x)$.

Problem 3: Section 7.1 # 98.

Problem 4: Section 7.1 # 112.