1. (2) Using the linearity of the Laplace transform, calculate the Laplace transform of
   
   \[ f(t) = \sinh(at) \]

2. (2) Using the shift theorem find the Laplace transform of
   
   \[ f(t) = e^{2t^2} \]

   The next two questions are about the Laplace transform of \( f' \), recall the formula

   \[ \mathcal{L}(f') = s \mathcal{L}(f) - f(0) \]

3. (2) Find the Laplace transform of both side of the identity
   
   \[ \frac{d}{dt} \cosh 3t = 3 \sinh 3t \]

   and verify that you get the same answer on each side. The idea is that you do the right hand side using the table entry for \( \sinh(3t) \) and the left hand side using the formula for \( f' \) with \( f = \cosh(3t) \). \( \cosh(0) = 1 \) by the way.

4. (2) Find the Laplace transform of both sides of the differential equation
   
   \[ 2 \frac{df}{dt} = 1 \]

   with initial conditions \( f(0) = 4 \). By solving the resulting equations find \( F(s) \). Based on the Laplace transforms you know, decide what \( f(t) \) is.