1. Solve the following differential equations.

   a. $y''+2y'-3y=2e^x$. (10%)

   b. $y'=2\dfrac{y\ln y}{x}$. (10%)

2. Find the Laplace transform of the following function.

   a. $t\sin(t+a)$. (10%)

   b. $t^3\sinh 2t$. (10%)

3. Solve the following equation.

   $y(t)-\int_0^t y(\tau)\sin(t-\tau)d\tau=1$. (20%)

4. Evaluate the surface integration $\iint_S F\cdot n\,dA$ with $\mathbf{F}=[2x,z,3y]$, S:x+y+z=2, x≥0, y≥0, z≥0. (20%)

5. Find the Fourier series of the periodic function f(x), of period of P=2π

   f(x)=x+π/2, −π<x<π. (20%)