1. Given a circle $(x-a)^2+(y-b)^2=c^2$ to
   (a) Calculate the area of the circle, (5%)
   (b) Find the center $(\bar{x}, \bar{y})$ of the circle (5%)
   (c) Calculate $I_x(=\iint y^2 dA)$ and $I_y(=\iint x^2 dA)$ (10%)

2. Solve the differential equation
$\frac{d^2y}{dx^2}+(a+b)\frac{dy}{dx}+aby=f(x)$, $c\le x\le d$, $y(c)=\alpha$, $y(d)=\beta$. (20%)

3. (a) Expand the Fourier expansion $F(t)$ of the function t, $-1\le t\le 1$, (10%)
   (b) Calculate the error $E=\int_0^1 (t-F(t))^2 dx$. (10%)

4. (a) Given three point $B(0,0,0)$, $C(a,b,c)$ and $D(d,e,f)$ to find the area enclosed by the vectors $\vec{BC}$ and $\vec{BD}$. (5%)
   (b) Given a surface $z=f(x,y)$, $a\le x\le b$, $c\le y\le d$, to find the expression of the surface area. (5%)
   © Use the result of (b) to calculate the surface $x^2+y^2+z^2=a^2$, $z\ge 0$.. (10%)

5. Find the solution for the heat equation $\frac{\partial T}{\partial t}=\frac{\partial^2 T}{\partial x^2}$, $0\le x\le 1$, $T(0,t)=50$, $T(1,t)=100$, $T(x,0)=100$. (20%)