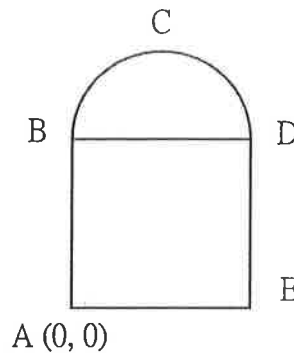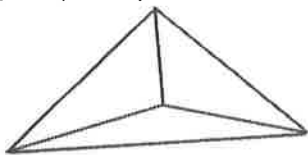※本項考試依簡章規定各考科均「不可以」使用計算機　　本科試題共計 1 頁

1. (15%) Solve the following ordinary differential equation: $y' + xy = x$

2. (15%) Find the general solution of the following ordinary differential equation: $y'' + y' + y = x$

3. (10%) Solve the following system of linear equations:
$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & -1 & 5 \\ 3 & 2 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 1 \\ 6 \end{bmatrix}$$

4. (15%) Compute the line integral $\oint_{ABCDEA} y\,dx - x\,dy$ where ABDE is a square, and B-C-D is half of a circle with radius of 2.

5. (15%) Compute the area of surface S that is the part of sphere and $z \geq 6$.　The center of the sphere is (0, 0, 0) and the radius is 10.

6. (15%) Compute the volume of the tetrahedron with vertices (0, 1, 2), (-1, 2, 0), (9, 2, 1), (3, -5, -2) .

7. (15%) Find the Fourier Series of the function $f(x) = |x| - 1, -1 \leq x \leq 1$