※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1.　10% (a) Find real a, b , such that b > 0 and a + bi is a cube root of −1.

　　　(b) Write f(t) = 2 cos(4t) − 2 sin(4t) in the form A cos(ωt − φ).

2.　20% $M = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 2 & -1 & -1 \end{pmatrix}$　　　　$M^{-1} = \frac{1}{12}\begin{pmatrix} 1 & 1 & 4 \\ a & 7 & -8 \\ b & -5 & 4 \end{pmatrix}$

　　(a) Find the numbers a and b in the formula for the matrix M^{-1}

　　(b) Find the solution $\underset{r}{\rightarrow} = \langle x, y, z \rangle$ to $\boxed{\begin{array}{l} x + 2y + 3z = 0 \\ 3x + 2y + z = t \\ 2x - y - z = 3 \end{array}}$ as a function of t

3.　20% Use series to find the general solution of $(1- x^2)y'' - xy' + y = 0$,

　　where $|x| < 1$, in the form

　　　$y = \sum_{n=0}^{\infty} a_n x^n$

　　with a_0 and a_1 arbitrary.

4.　20% Solve the following differential equation and provide general solution of y(x)

　　　(a) $\frac{dy}{dx} + 3x^2 y = x^5$ (10%)

　　　(b) $(y - x^2 y)\frac{dy}{dx} = x + 1$ (10%)

5.　15% Find the solution of the ordinary differential equation and what are the eigenvalues of the differential equation?

　　$y'' + 5y' + 4y = 3 - 2x$, 　y(0)=11/8, y'(0)=1/2

6.　15% Find the inverse Laplace transform of

　　　$F(s) = \frac{s+1}{s^4+2s^3-2s-1}$