逢甲大學 95 學年度轉學生招生考試試題

科目	工程數學	適用系別	環科系三年級	時間	80 分鐘

1. (16%) Given $L\{\cos t\} = \frac{s}{s^2+1}$, use $L\{f(at)\} = \frac{1}{a}L\{f(t)\}\big|_{s\to s/a}$ to determine $L\{\cos bt\}$.

2. (16%) Find the inverse of the transform: $\frac{s}{s+2}$.

3. (18%) Find the expansion of the periodic function whose definition in one period is
$f(t) = \begin{cases} -t & \text{if } -3 < t < 0 \\ t & \text{if } 0 < t < 3 \end{cases}$

4. (20%) Solve the following **initial value problems**:
   (1) $2xydy = (x^2 + y^2)dx \quad y(1)=2$
   (2) $y''+4y' + 4y = 0 \quad y(0) = 2, \quad y'(0) = 0$

5. (15%) Find a **solution** of the following linear system:
$y_1' = -5y_2 + 23$
$y_2' = -5y_1 + 15t$ $\quad y_1(0)=1, \quad y_2(0)=0$

6. (15%) Find a **power series solution** in powers of x of the following differential equation:
$y'=2xy$