國立中央大學九十學年度碩士班研究生入學試題卷

所別: 機械工程學系 丁組 科目: 工工程數學 共 1 頁 第 1 頁

1. Solve the following partial differential equation: (25%)

$$\frac{\partial u}{\partial t} = 2\frac{\partial^2 u}{\partial x^2}$$
$$u(0,t) = u(1,t) = 0$$
$$u(x,0) = x$$

2. A 16-foot long chain weighting m pounds per foot hangs over a small pulley, which is 20 feet above the floor. Initially, the chain is held at rest with 7 feet on one side and 9 feet on the other side, as in Figure 1. How long after the chain is released, and with what velocity, will the chain leave the pulley? (25%)

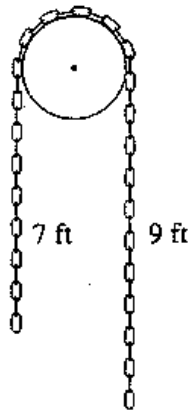

Figure 1
Chain on a pulley.

3. If A and B are compatible matrices of rank r and s, respectively, prove that rank(AB) ≦ minimum (r,s). (25 %)
(Hint: Using a row partition of A, show that the rank of AB is at most equal to r and then using a column partition of B, show that the rank of AB is at most equal to s.)

參考

4.

請畫一程式流程圖及寫一程式(C, C++, Fortran or Basic)來解下題：
任意輸入一 n 值 (n 是可變值，10 ≤ n ≤ 20)及 n 個實數值，計算其中大於零的數值個數及其平均值，將結果輸出至螢幕。

例如:

n 值:	11
n 個數值:	1.2 -2. 3. 4. -3. 0. -6. 4. -5. -9. -4.
大於零:	1.2 3. 4. 4.
個數:	4
平均值:	3.05