

Mathematical Physics, Autumn 2008

Assignment 3 (due Monday 27/10/2008)

1. Arfken 5.2.10
2. Arfken 5.2.13
3. Arfken 5.3.1(a)
4. Arfken 5.4.3
5. Arfken 5.5.3
6. Arfken 5.6.13
7. Arfken 5.6.20
8. Arfken 5.7.4
9. Arfken 5.9.9
10. Arfken 5.10.4
11. Arfken 5.11.5
12. Consider the most general second order linear recurrence relation

$$f_n = af_{n-1} + bf_{n-2} .$$

- (a) Convert this to a matrix equation of the form

$$\begin{pmatrix} f_{n+1} \\ f_n \end{pmatrix} = M^n \begin{pmatrix} f_1 \\ f_0 \end{pmatrix} .$$

- (b) When M has distinct eigenvalues λ_1 and λ_2 , calculate f_n in terms of only $\lambda_1, \lambda_2, n, f_1, f_0$. (Do not keep any a or b dependence.)
- (c) When both the eigenvalues of M are degenerate and equal to λ_0 , calculate f_n in terms of only λ_0, n, f_1, f_0 . (Do not keep any a or b dependence.)

Not to be submitted:

1. Arfken 5.1.2
2. Arfken 5.2.1
3. Arfken 5.2.7(e)
4. Arfken 5.2.9
5. Arfken 5.2.11
6. Arfken 5.2.20
7. Arfken 5.5.4
8. Arfken 5.6.6
9. Arfken 5.6.8
10. Arfken 5.6.22
11. Arfken 5.7.9
12. Arfken 5.9.10
13. Arfken 5.10.8
14. Arfken 5.11.2
15. Arfken 5.11.9