

MATH413 HW 8

due **April 23** before class, answer without justification will receive 0 points. Staple all your papers.

1: Solve the following recurrence relation using generating functions

$$h_n = h_{n-1} + 9h_{n-2} - 9h_{n-3}$$

with initial values $h_0 = 0$, $h_1 = 1$ and $h_2 = 2$.

2: Solve the following recurrence relation using characteristic equation

$$h_n = 11h_{n-1} - 35h_{n-2} + 25h_{n-3}$$

with initial values $h_0 = 6$, $h_1 = 19$ and $h_2 = 104$.

3: Solve the nonhomogeneous recurrence relation

$$h_n = 6h_{n-1} - 9h_{n-2} + 2n$$

with initial values $h_0 = 1$ and $h_1 = 0$ using both

- (a) characteristic equation; and
- (b) generating functions.

4: Solve the nonhomogeneous recurrence relation

$$h_n = 4h_{n-1} + 3 \times 2^n$$

with initial value $h_0 = 1$ using both

- (a) characteristic equation; and
- (b) generating functions.

5: Let

$$g(x) = \frac{x^2 - 3x + 1}{4x^3 - x^2 - 2x + 1}$$

be a generating function for a sequence $h_0, h_1, h_2, \dots, h_n, \dots$. Find a linear homogeneous recurrence relation for the sequence and include also the initial values.