

MATH 239 — Fall 2007 – Sample Quiz

No calculators or other aids may be used. Each part-question is worth 5 marks.

1. (a) Determine the following coefficient, as a summation, where t and n are nonnegative integers.

$$[x^n](1-x)^t(1+2x^2)^{-3}$$

[5]

- (b) Find the generating function for compositions of n , where each part is an odd number greater than 4. (Note the number of parts is not fixed.) [5]
2. (a) Write a decomposition of the set S of binary strings that do not contain a block of 0's of length exactly 2, that uniquely creates the elements of S . [5]
- (b) Find the generating function with respect to length for the set Q of binary strings, where

$$Q = (\{\varepsilon\} \cup \{00\})(\{1\}\{11\}^*\{00\}\{0\}^*)^*\{1\}^*.$$

Express your answer as $\frac{p(x)}{q(x)}$ where $p(x)$ and $q(x)$ are polynomials.

[5]