

**Directions:** Solve the following problems. All written work must be your own. See the course syllabus for detailed rules.

1. [9.1.4,9.1.12] Find the coefficient of  $x^n$  in the power series for:

(a)  $\frac{1}{(1-7x)^4}$

(b)  $\frac{x^2}{(1-x^3)^6}$

2. Let  $a_n$  be the number of non-negative integer solutions to  $x_1 + 3x_2 + 5x_3 = n$ . Find the corresponding OGF  $A(x)$ .

3. Let  $a_0 = 0$  and  $a_n = 2a_{n-1} + 2^n$  for  $n \geq 1$ .

(a) Find the OGF  $A(x)$ .

(b) Use the OGF to give a closed formula for  $a_n$ .