

PROBLEM SET 7: BINOMIAL THEOREM AND VIETA'S FORMULAS BASICS

CS 198-087: INTRODUCTION TO MATHEMATICAL THINKING
UC BERKELEY EECS
SPRING 2019

This homework is due on Sunday, April 14th, at 11:59 PM on Gradescope. As usual, this homework is graded on participation, but it is in your best interest to put full effort into it. This is a good opportunity to learn how to use L^AT_EX.

1. Binomial Theorem — General Term

Let $g(x) = (2x^5 - 3x^2)^7$.

- What is the sum of the coefficients of the expansion of $g(x)$?
- Find the general term of the expansion of $g(x)$.
- What is the coefficient on x^{20} ?
- What is the coefficient on x^{18} ?

2. Approximations with the Binomial Theorem

Use the first three terms of the binomial expansion to approximate each of the following values. Use a calculator to simplify immediate steps if need be, but only when absolutely necessary.

Compare your results with the true values.

- 5.02^3
- $31^{-\frac{1}{5}}$

3. Sums of Coefficients

- Three roots of $x^4 + ax^2 + bx + c = 0$ are 9, -3 and 2. Determine $a + b + c$. (*Hint: What is the coefficient of x^3 ?*)
- Suppose $P(x)$ is a polynomial such that

$$x^{23} + 23x^{17} - 18x^{16} - 24x^{15} + 108x^{14} = (x^4 - 3x^2 - 2x + 9)P(x)$$

Determine the sum of the coefficients of $P(x)$.