

MATH. 125, QUIZ 15 - Section 10.5

You may not use a calculator. Show each step of your solution, you do not get credit for just writing the final answer. Simplify all answers as much as possible. You may get extra/bonus credit for presenting and explaining your solutions in a professional way (like in the textbook).

1. (4 points) Evaluate

$$\binom{10}{3} = \frac{10!}{3!(10-3)!} = \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8 \cdot 9 \cdot 10}{1 \cdot 2 \cdot 3 \cdot 1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7} = \frac{8 \cdot 9 \cdot 10}{1 \cdot 2 \cdot 3} = 120$$

2. (5 points) Using the Binomial Formula expand and simplify the following expression

$$\left(2x - \frac{1}{2}\right)^5 = 32x^5 - 40x^4 + 20x^3 - 5x^2 + \frac{5}{8}x - \frac{1}{32}$$

3. (6 points) Using the Binomial Formula expand and simplify the following expression

$$\begin{aligned} (2x - 5)^4 &= x^4 + 4(2x)^3(-5)^1 + 6(2x)^2(-5)^2 + 4(2x)^1(-5)^3 + (-5)^4 \\ &= x^4 - 160x^3 + 600x^2 - 1000x + 625 \end{aligned}$$

4. (6 points) Using the Binomial Formula expand and simplify the following expression

$$\left(x - \frac{3}{\sqrt{x}}\right)^3 = x^3 - 9x^{\frac{3}{2}} - 27x^{\frac{2}{3}} + 27.$$

5. (6 points) Use the Binomial Formula to find the coefficient of x^3 in the expression $\left(\frac{x}{2} - 1\right)^{10}$; simplify your answer.

$$\left(\frac{x}{2} - 1\right)^{10} = \sum_{j=0}^{10} \frac{10!}{j!(10-j)!} \left(\frac{x}{2}\right)^j (-1)^{10-j} = \dots \frac{10!}{7!3!} \left(\frac{x}{2}\right)^3 (-1)^7 \dots = \dots - \frac{8 \cdot 9 \cdot 10}{3!} \cdot \frac{1}{8} x^3 \dots = \dots - 15x^3 \dots$$