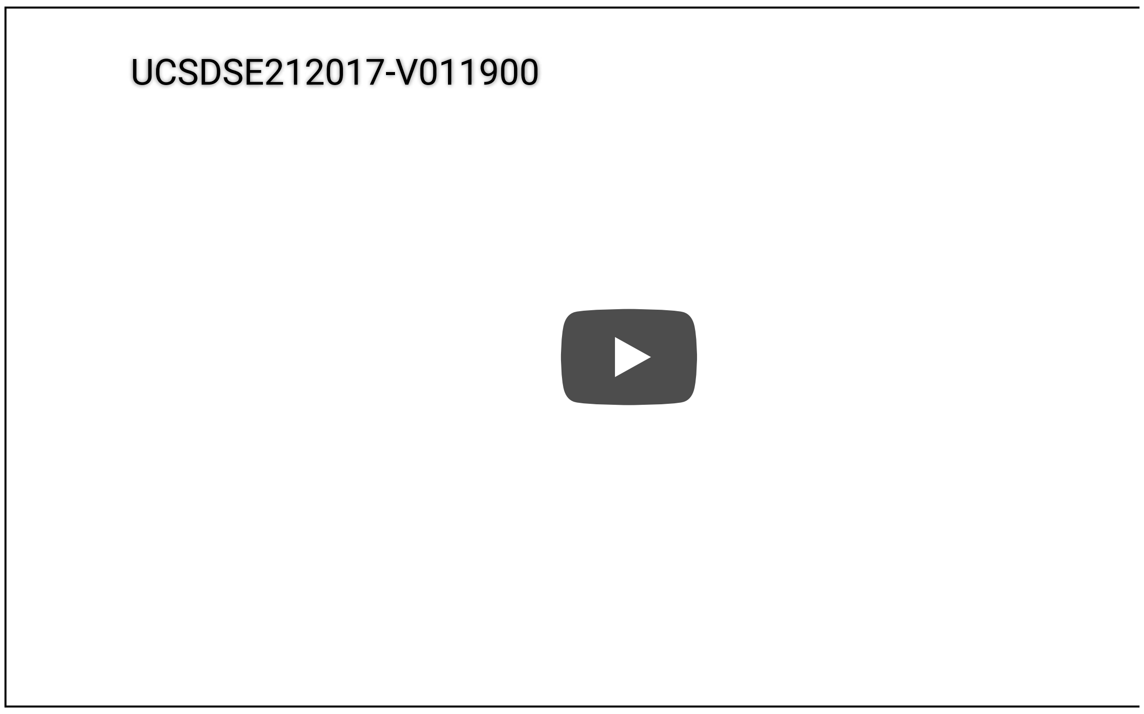
The binomial Theorem

Problem Sets due May 28, 2022 08:13 +03

Video



18:45 / 21:28 1.0x HD

of the binomial coefficients.

In other words, we talked about binary sequences

or choosing a set, subset from a set of size k,

and what we want to do next is

talk about larger alphabet sequence,

also for larger alphabets,

And that's what we'll do in the next lecture. See you then.

End of transcript. Skip to the start.

4.6_Binomial_Theorem

POLL

What is the coefficient of x^2 in the expansion of (x+2)^4?

- ○ **12**
- ○ **24**
- ○ **48**
- ◉ **None of the above**

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FEEDBACK

The answer is (4 choose 2) * 2^2 = 24.

1 (Graded)

2/2 points (graded)

- What is the coefficient of x^4 in the expansion of $(2x-1)^7$?

-560 ✔ **Answer:** -560

-560

Explanation

By binomial theorem, the number of terms that contain $(2x)^4$ is $\binom{7}{4}$. Hence, the coefficient of x^4 is $2^4 \times (-1)^3 \times \binom{7}{4} = -560$.

- What is the constant term in the expansion of $(x - \frac{2}{\;})^6$?

- What is the constant term in the expansion of $(x - \frac{2}{x})^6$?

-160

✔ **Answer:** -160

-160

Explanation

$(x - \frac{2}{x})^6 = (x^2 - 2)^6 (\frac{1}{x})^6$. To find the constant term, we just need to find the coefficient of x^6 in $(x^2 - 2)^6$. The number of terms that contain x^6 is $\binom{6}{3}$, so the coefficient is $1^3 \times (-2)^3 \times \binom{6}{3} = -160$

Submit You have used 4 of 4 attempts

Answers are displayed within the problem

2 (Graded)

2/2 points (graded)

What is the coefficient of x^2 in the expansion of $(x+2)^4 (x+3)^5$?

23112

✔ **Answer:** 23112

23112

Explanation

Consider $(x+2)^4 (x+3)^5$ as the product of $(x+2)^4$ and $(x+3)^5$, there are 3 ways to get x^2: (1) multiply the x^2 term in $(x+2)^4$ and the constant term in $(x+3)^5$, (2) multiply the x term in $(x+2)^4$ and the x term in $(x+3)^5$, (3) multiply the constant term in $(x+2)^4$ and the x^2 term in $(x+3)^5$.
Hence the result is the sum of these 3 ways $\binom{5}{2} 2^4 3^3 + \binom{4}{1}\binom{5}{1} 2^3 3^4 + \binom{4}{2} 3^5 2^2 = 23112$.

Submit You have used 3 of 4 attempts

Answers are displayed within the problem

3

0 points possible (ungraded)

In an earlier section, we solved this question by mapping the sets A and B to ternary sequences. In this section, we ask you to solve it using the binomial theorem.

How many ordered pairs (A, B), where A, B are subsets of $\{1, 2, 3, 4, 5\}$ have:

- $A \cap B = \emptyset$

- $A \cup B = \{1, 2, 3, 4, 5\}$

Submit You have used 0 of 4 attempts

4

0 points possible (ungraded)

Which of the followings are equal?

- [ ] $\binom{10}{4}$
- [ ] $\binom{10}{5}$
- [ ] $\binom{10}{6}$
- [ ] $\binom{9}{5} + \binom{9}{6}$

Submit

You have used 0 of 3 attempts

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