

Homework 12: Review

HW12 is Due January 11; submit it to Google classroom 15 minutes before the class time.

ALGEBRAIC EXPRESSIONS

1. Factor the following expressions:

(a) $6x^3y^5 - 9xy^3$

(b) $x^4 - 16$

2. Simplify the following expressions:

(a) $\frac{x}{x+1} - \frac{x}{x-1}$

(b) $\left(1 + \frac{1}{x}\right) \div \left(x - \frac{1}{x}\right)$

3. Simplify the following expressions:

(a) $x^2(3xy^3)^2(2x^2y)^3$

(b) $\frac{a^3(2b^2c^3)^2}{(a^2b)^4c^5}$

4. Expand the following expressions:

(a) $(x - 2)^2(x + 3)$

(b) $(a - 2)^2(a + 2)^3$

5. Write each of the following expressions in the form $a + b\sqrt{5}$, with a, b rational numbers:

(a) $(1 + \sqrt{5})^2$

(b) $\frac{1 + \sqrt{5}}{1 - \sqrt{5}}$

(c) $\frac{1 + 2\sqrt{5}}{\sqrt{5}}$

COMBINATORICS

- How many different sequences of letters could you make from the letters of the word "paper"?
- There are 6 people in a house. This is over capacity: the fire capacity of the house is 5.
 - How many ways are there to kick one person out of the house?
 - In how many ways could you get the house down to capacity if the fire capacity were 4 instead of 5?
- How many ways are there to choose a committee of three people from a group of six people? What if one of the committee members must be selected to be president?
- The probability that it rains on any given day is $p = 1/3$. During a given week, what is:
 - the probability that it will rain every day?
 - the probability that it will rain on exactly one day? (c) the probability that at least one day will be sunny?