

# Algebra Review

## Reading

- Review the algebra cheatsheet at the front of the book.
- Read sections 1.1, 1.2

## Practice problems

- Section 1.1: 11, 15, 17, 23
- Section 1.2: 11, 13, 15, 22, 25, 35, 37

## Notes

### Algebra

- Multiplication distributes over addition
- Identities for  $(x \pm y)^2$ ,  $x^2 - y^2$ ,  $x^3 \pm y^3$ 
  - Question: Simplify  $(x - y)^2 + (x + y)^2$
  - Conclusion: If a integer is the sum of two squares, then so is its double
  - What about  $(x + y)^2 - (x - y)^2$ ?
  - Conclusion: The product of two even numbers is a difference of squares
- Multiplicative inverses
- Division is multiplication by the inverse
  - $\frac{a}{b} = a\frac{1}{b}$
  - $\frac{c}{b/a} = \frac{ac}{b}$
- Solving a linear equation such as  $5x + 3 = 6x - 1$
- Find the error in proof that  $0 = 1$
- Solving an equation such as  $(x - 2)(x + 1)(x - 3) = 0$
- Linear functions and linear equations
  - Rise-over-run interpretation
  - Slope-intersect, point-slope, point-point forms
  - Does this describe all lines in the plane?
- Solving a quadratic equation such as  $2x^2 - 6x + 4 = 0$ 
  - Quadratic formula and completing the square
  - Graph of quadratic

## Inequalities

- Trichotomy:
  - For any two numbers  $a, b$ , either  $a < b$  or  $a = b$  or  $a > b$
  - Every number is either positive, zero, or negative
- Inequalities and addition
- Inequalities and multiplication (when does the direction reverse?)
- Absolute value
- Triangle inequality
- Various interpretations of the inequality  $|x - a| < r$
- Question: If  $|x - 1| < 2$ , then:
  - Is it true that  $|x - 1| < 1$ ?
  - Is it true that  $|x - 1| < 3$ ?
  - Is it true that  $x > -3$ ?
  - Is it true that  $x > 0$ ?