

# Math 115: Precalculus

## Checking your standing

### A. Things should be in your kit

- The three properties of real numbers
- Open and closed intervals
- Taking powers and roots
- How to factor or expand “simple” expressions
- Manipulating rational expressions
- Solving linear and quadratic equations
- Plotting points on the coordinate plane
- Midpoint and distance formula
- Sketching graphs of functions
- Intercepts
- Lines: slopes, equations (point-slope, slope-intercept, and general forms), parallelism and perpendicularity,
- Solving linear and “simple” nonlinear inequalities
- Solving equations and inequalities by graphing

### B. Problems

1. Simplify

$$\left( \frac{x^{3/2} y^2 z^{2/3}}{x y^{1/2} \sqrt[4]{z^3}} \right)^6.$$

2. Expand then factor

$$(x + 3)^3 - (x - 2)^3 - 3(x - 1)^2 - 4x - 26.$$

3. Simplify

$$\left[ 1 + \frac{3}{x-1} - \frac{4}{x^2 - 2x + 1} \right] \div \frac{x^2 - x - 12}{x^2 - 1}.$$

4. Solve

$$\frac{2x+1}{x-3} - \frac{x+2}{x+3} = \frac{x^2+2x-3}{x^2-9}.$$

5. Solve

$$\frac{x+1}{x-1} + \frac{x-1}{x+1} = \frac{4x}{x^2-1}.$$

6. Solve

$$2x+3 \geq 5x+4.$$

7. Sketch the graph of the binomial  $x^2 - 5x + 7$  and use it to give a rough solutions to the inequalities  $x^2 - 5x + 7 > 1$ .
8. Draw the line  $3x + 2y + 6 = 0$ . Locate the  $x$ -intercept  $P$  and the  $y$ -intercept  $Q$ . Find the midpoint  $R$  of  $PQ$  and then calculate the length of  $QR$ .
9. Find the equation of the line passing through the origin and perpendicular to the line  $2x + y = 6^{-2/3}$ .
10. Find the equation of the line passing through the point  $(-2, 1)$  and parallel to the line  $x - 2y = 3^{7/2}$ .