

## Homework 1

### Question 1

- a) Determine the solution set for the absolute value inequality  $|2x + 5| \leq 3x - 2$ .
- b) Solve the absolute value inequality  $|x^2 - 4| \geq 3$ .
- c) Solve the absolute value inequality  $|x - 2| + 3 > 9$ .

### Question 2

- a) Completely factor the expression  $2x^3 - 8x^2 - 12x$ .
- b) Factor the quadratic expression  $2x^2 + 11x + 15$

### Question 3

- a) Evaluate the value of  $\frac{(-3a)^4(-3a)^3}{(-3a)^2(-3a)^1}$ .
- b) Simplify the expression  $\frac{3x^{-4}y^{-3}-3x^{-3}y^{-4}}{3x^{-2}y-3xy^{-2}}$ .

### Question 4

- a) Simplify  $\sqrt{18} - \sqrt{8}$ .
- b) Evaluate  $\sqrt{4x^2 + 9y^2}$  when  $x = 3$  and  $y = 2$ .

### Question 5

A ball is launched from the ground. Its trajectory can be modeled by the following equation:

$f(x) = -x^2 + 8x + 5$  where  $f(x)$  denotes the ball's position. At what x-coordinate does the ball land? How far does the ball travel? (Hint: for the total distance, consider both roots.)

### Question 6

Determine the end behavior of the polynomial  $f(x) = -2x^3 + 4x^2 - 5x + 3$ . Plot the polynomial. Show the results

### Question 7

- a) Find the domain of the rational function:  $f(x) = \frac{x^2-4}{x+2}$ .
- b) Determine the vertical asymptote(s) of the rational function:  $f(x) = \frac{3x-1}{x^2-4}$ .
- c) Find the horizontal asymptote(s) of the rational function:  $f(x) = \frac{5x^3+2x^2-3}{3x^3+x+1}$ .
- d) Find the x-coordinate(s) of any holes in the rational function:  $f(x) = \frac{x^2-9}{x^2-4}$ .

### Question 8

Divide the polynomial  $4x^3 + 2x^2 - 3x + 1$  by  $2x - 1$