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

Let $f(x)$ be a polynomial function of degree 4. If $f(1) = 5$, $f(2) = 8$, $f(3) = 12$, $f(4) = 21$find the value of $f(5)$.

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 $2x - 1$