

DO NOT SOLVE PROBLEMS IN THIS PAGE. USE THE ATTACHED BLANK SHEET!!!

1. Simplify as much as possible the following expressions:

(a) $\frac{x^2 + 3x - 4}{x^2 - 3x + 2} \cdot \frac{3x^3 - 12x}{2x^2 + 2x} \div \frac{9x^2 - 36}{x^2 - x - 2}$

(b) $\left(\frac{120x^{-3}y^{-1}z^4}{75x^{-1}y^2z^{-4}}\right)^4$ (c) $\frac{2x - 8}{\sqrt{x} - 2}$ (d) $\sqrt[4]{\frac{80xy^2z}{45x^2y^4z^3}}$

2. Solve the following equations:

(a) $9x^2 + 4 + 4x = 20$ (b) $3 + 6x - \sqrt{30 - x} = 5x + 3$

(c) $\frac{x}{x+1} + \frac{3}{x-1} = \frac{6}{x^2 - 1}$

3. Solve the following inequalities giving the solution in interval notation when possible:

(a) $\frac{1}{2} \leq \frac{5x - 6}{4} \leq 8$ (b) $\frac{x^2 - x}{x^2 - 4} \geq 0$ (c) $-2|6 - 4x| + 6 \geq 2$

3. Given the following lines L_1 , L_2 , and L_3 :

$L_1: y = 2x - 3$ $L_2: y = -2x + 5$ $L_3: y = 3x + 1$

- Find the intersection point of L_1 and L_2 .
- Are L_1 and L_2 perpendicular lines? Explain your answer.
- Find the equation of the line L_4 that goes through the intersection point of L_1 and L_2 and is parallel to L_3 . Explain.

4. Sketch the graph of the following Polynomial functions:

$Q(x) = x^5 + 8x^4 - 20x^3 + 2x^2 + 19x - 10$

$P(x) = (x+1)^2(x+3)(x-1)^3(x+2)$

5. Given the parabola $y = f(x) = 2x^2 + 8x - 24$, find (show your work!!):

- Whether it is opening up or opening down
- Interception with the axis
- Vertex
- Axis of symmetry
- Domain and range with interval notation
- Sketch its graph

6. Given the following rational function $R(x) = \frac{x^2 - 6 + 8}{x^2 - 1}$:

- Factor both the numerator and denominator
- Find x-, and y- intercepts (if any)
- Find the horizontal Asymptotes
- Find the vertical asymptotes
- Sketch the graph

7. Given the following graph of $F(x)$, find:

- Domain
- Range
- x-intercepts
- y-intercepts
- increasing and decreasing intervals

