

Part I: Solve each of the following questions completely

(2 points) Evaluate and simplify $\frac{4 - \frac{2}{3}}{\frac{7}{12} - \frac{5}{4}}$.

(10 points) Evaluate $\frac{\frac{1}{3} + \frac{3}{2}}{\frac{3}{7} + \frac{2}{10}}$

(1.5 points) Simplify $\frac{\frac{2}{5} - \frac{3}{10}}{\frac{1}{2} + \frac{2}{5}}$

(10 points) Simplify the expression $\frac{x^{-2} + \frac{x}{y^3}}{x^{-1} + y^{-1}}$

(2 points) Simplify the expression $\left(\frac{4 x^{-1} y^{\frac{1}{3}}}{z} \right)^{-2} \left(\frac{16 x^2}{y^{\frac{1}{3}} z^{-5}} \right)$

(10 points) Simplify the expression $\left(\frac{3 y^3 z^{\frac{2}{3}}}{x^{\frac{1}{2}}} \right)^2 \left(\frac{x^{-3} y^6}{27 z^4} \right)^{\frac{1}{3}}$.

Assume that all letters denote positive numbers.

(10 points) Simplify the expression $\left(\frac{3x^2y^{-1}}{2z^{-3}} \right)^{-3} \left(\frac{x^{\frac{-1}{2}}y^2}{z} \right)^2$,
where x , y and z are positive real numbers.

(2 points) Simplify the expression $\left(\frac{2x^{\frac{1}{2}}}{y^{\frac{4}{3}}} \right)^3 \left(\frac{y^2}{x^{\frac{-1}{2}}} \right)$.

(2 points) Perform the division and simplify.

$$\frac{x - 5}{2x^2 - 5x - 12} \div \frac{x^2 - 9x + 20}{2x + 3}$$

(3 points) Simplify $\frac{5x + 10}{x^2 - 2x - 3} \div \frac{x^2 - 4}{x + 1}$

(2 points) Simplify the expression $\frac{x^2+7x+12}{2x+6} \div \frac{x^2-16}{x^2+1}$.

(7.5 + 7.5 = 15 points) Factor each of the following completely.

a) $8x^4 y - 27 x y^4$.

b) $4x^3 + 12 x^2 - x - 3$

(3 points) Factor completely.

a. $2x^4 + 16x$

b. $9x^3 - 18x^2 + x - 2$

a. Factor $t^3 + 3t^2 - 4t - 12$ completely.

Compute $(7 - i)(4 + 2i)$

(3 points) Factor each of the following completely.

a. $(x^3 - 27)$

b. $(x^3 - 2x^2 + 4x - 8)$

(3 points) Factor the expression completely.

a. $x^{\frac{3}{2}} - 6x^{\frac{1}{2}} - 16x^{\frac{-1}{2}}$

b. $2x^3 - x^2 - 18x + 9$

Factor the expression completely

a. $x^3 - 5x^2 - 4x + 20$

b. $\left(a + \frac{4}{b^2}\right)^2 - \left(a - \frac{4}{b^2}\right)^2$

(10 points) Find all solutions of the equation $x^2 - 4x - 1 = 0$.

(15 points) Find the solution set of the equation $2x^2 - 5x + 1 = 0$

Find the solution set of the equation $x^2 + 2x - 4 = 0$.

(3 points) Solve the following equation .

$$x^4 - 5x^2 + 4 = 0$$

(2.5 points) Find the solution of the equation:

$$x^2 + 6x - 3 = 0$$

(10 points) Find all solutions of the inequality $|5x + 3| \geq 2$.

(15 points) Find the solution of the inequality

$$\frac{x - 5}{x^2 - 3x + 2} \leq 0.$$

(2 points) Find the solution of the inequality

$$x^3 - 5x^2 - 14x < 0$$

2. (3 points) Find the solution of the inequality $\frac{x}{x-1} \geq 2$.

(2 points) solve the following inequality.

$$x^3 - 3x^2 - 18x \leq 0$$

(2.5 points) Find the solution of the inequality $\frac{5x - 3}{x + 2} \leq 1$.

(1.5 + 1 + 2.5 points) Given the points $A(2, 1)$ and $B(4, -3)$.

a. Find the distance between A and B.

b. Find the midpoint of the line segment $\overline{AB}$.

(7.5 + 7.5 = 15 points) Let $A(4,2)$ and $B(5, -3)$. Find:

(a) The distance between A and B .

(b) The midpoint of the line segment joining A and B

(3 points) Find an equation of the circle that has the points $P(-6, 2)$, and $Q(2, 2)$ as endpoints of a diameter.

(3 points) Find an equation of the circle that has center $(4, -1)$ and passes through $(6, 2)$.

(10 points) Find an equation of the circle that has center $(7, -2)$ and passing through $(4, 1)$.

(2 points) Find an equation of the line passing through the points $P(1, -3)$ and $Q(-2, 6)$.

(10 points) Find an equation of the line passing through the points $P(1,3)$ and $Q(-1, -4)$.

(2 points) Find an equation of the line through the point $P(3, 5)$ that is parallel to the line $3x + 2y - 1 = 0$.

(10 points) Find an equation of the line passing through the point $P(-5, 2)$ and parallel to the line whose equation is $4x - 3y - 1 = 0$

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