Problem 1

Simplify the following:

(a) $\left(\dfrac{3x^{3/2}y^3}{x^2 y^{-1/2}}\right)^{-2}$

(b) $\dfrac{\dfrac{y}{x} - \dfrac{x}{y}}{\dfrac{1}{y} - \dfrac{1}{x}}$

Problem 2

Draw the intervals for the following inequalities on the real number line:

(a) $x^2 < 2x + 8$

(b) $|x - 4| < 3$

Problem 3

Find an equation of the line that passes through the point $(2, -5)$ and

(a) has slope -3

(b) is parallel to $x - axis$

(c) is parallel to $y - axis$

(d) is parallel to the line $2x - 4y = 3$

Problem 4

Find the center and radius of the circle with equation $x^2 + y^2 - 6x + 10y + 9 = 0$

Problem 5

Find the domain of the following functions:

(a) $f(x) = \dfrac{x + 1}{x - 5}$

(b) $g(x) = 2x + 3$

(c) $h(x) = x^2$

(d) $k(x) = 3\sin x$

(e) $p(x) = -2\cos x$

(f) $t(x) = 2e^x$

Problem 6

If $f(x) = x^2 + 2x - 1$ and $g(x) = 2x - 3$, find $g \circ f$.

Problem 7

Prove the identity: $\dfrac{2 \tan x}{1 + \tan^2 x} = \sin 2x$.

Problem 8

Write the following in set-builder notation.

(a) Set of all Natural numbers less than 40

(b) Set of all rational numbers greater than 3 and less than or equal to 7.

(c) $B = \left\{ 0, \dfrac{1}{2}, \dfrac{2}{3}, \dfrac{3}{4}, \dfrac{4}{5}, \dfrac{5}{6}, \ldots \right\}$

Problem 9

State whether the following intervals are open, closed or half open (half closed) and draw them on Number Line:

(a) $0 < x < 5$

(b) $4 \leq y \leq 18$

(c) $-3 \leq t < 0$

Problem 10

Draw the Regions:

(a) $A = \{(x, y) : -4 < x < 4 \text{ and } -3 \leq y \leq 0\}$

(b) $B = \{(x, y) : (x - 1)^2 + y^2 \leq 16\}$

Bonus Problem

If $\sin x = \dfrac{1}{3}$ and $\sec y = \dfrac{5}{4}$, where x and y lie between 0 and $\pi/2$, evaluate $\sin(x + y)$.