Problem 1 Simplify the following expression.

$$(x+y)^3 - (x-y)^3.$$

$$\boxed{2y(3x^2 + y^2)}$$

Problem 2 Find another form of the following expression (here $x > 1$ and $0 < h < 1$)

$$\frac{\sqrt{x+h} - \sqrt{x-h}}{h}.$$

$$\boxed{2/\left(\sqrt{x+h} + \sqrt{x-h}\right)}$$

Problem 3 Find the region of the number line on which the inequality is valid.

$$3x^2 - 2x > 1.$$

$$\boxed{x < -1/3 \text{ or } x > 1}$$

Problem 4 A circle in the xy-plane has center on the x-axis and contains the points $(-2, 4)$ and $(5, 3)$. Find the x-coordinate of the center of the circle.

$$\boxed{1}$$

Problem 5 How many points of intersection are there between the parabola $y = x^2$ and the circle with center at $(1, 1)$ and radius $\sqrt{2}$?

$$\boxed{\text{Two}}$$

Problem 6 Reflect the parabola $y = x^2$ through the line $x = 1$. Next reflect the resulting parabola through the line $y = -1$. Find the region on which the final parabola is increasing.

$$\boxed{x \leq 2}$$

Problem 7 Consider the following one-to-one function $f(x)$ on the given interval.

$$f(x) = \frac{x}{1 + x^2}, \quad 1 \leq x < \infty$$

Find the domain of the inverse function $f^{-1}(x)$.

$$\boxed{(0, 1/2]}$$

Problem 8 A sector of a circle subtends an angle of $\pi/3$ radians and has an area of 6π square cm. Find the arc length of the portion of the circumference in this sector.

$$\boxed{2\pi \text{ cm}}$$

Problem 9 Compute $\tan(4\pi/3)$.

$$\boxed{\sqrt{3}}$$

Problem 10 Find an equivalent form of $\sin(3\theta)$.

$$\boxed{-4\sin^3(\theta) + 3\sin(\theta)}$$