1. [10]	2. [15]	3. [10]	4. [10]	5. [15]	6. [10]	7. [10]	8. [10]	9. [10]	Total: [100]

Math 223 **Midterm** (8:00 AM version) **Sept 28, 2015**

Name: *Section:*

Closed book and closed notes. *Answers must include supporting work.*

Calculators and cell phones out of sight.

1. (10 pts) Solve the following inequalities:

(a) $|2+3x| \le 3$ (b) $|x-1| > 3$

2. (15 pts)

(a) Determine f and g such that $h(x) = f(g(x))$ for $h(x) = \sqrt{4x - x^2}$.

(b) Find the domain of $h(x)$.

3. (10 pts) Given a rectangle; its length is three times its width. Express its area A as a function of its perimeter P.

4. (10 pts) The equation $2x^2 - 4x + 2y^2 + 8y + 1 = 0$ describes a circle. Determine the circles center and radius by completing the square.

5. (15 pts) Sketch the following graphs:

(a) $y = |x - 3| + 2$ (b) $y = \sqrt{-x}$ (c) $y = x^2 - 2x + 1$

6. (10 pts)

(a) Find a polynomial of degree 3 with zeros -3, 0, and 3.

(b) Is $x - 1$ a factor of $P(x) = x^7 + 4x^6 - 2x^5 + x^4 - x^2 + 2x - 5$? Explain your answer. [Hint: use the Factor Theorem]

7. (10 pts) Find the quotient and the remainder using long division.

$$\frac{3x^4 - 5x^3 - 20x - 5}{x^2 + x + 3}$$

8. (10 pts) Write the following polynomial in factored form.

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

9. (10 pts) Sketch the region bounded by the parabola $x = y^2$ and the line $y = x - 2$ and label their points of intersection.