Warm-up Problems

1. Define/explain the following terms:
   (a) Function
   (b) Domain
   (c) Range
   (d) Independent variable
   (e) Dependent variable
   (f) Graph
   (g) Increasing function
   (h) Decreasing function
   (i) Even function
   (j) Odd function

2. What is the relation between radians and degrees? How do you convert between them? Who uses degrees and who uses radians?

3. What is a polynomial? Give some examples of polynomials.

4. Find the equation of a line connecting the given points:
   (a) (1, 3) and (2, 7)     Solution: $y = 4x - 1$
   (b) (1, 3) and (3, 4)     Solution: $y = x/2 + 5/2$
   (c) (1, 3) and ($\pi$, 3) Solution: $y = 3$
   (d) (1, 3) and (1, $\pi$) Solution: $x = 1$

Lecture Problems

5. Find the (natural) domain and range of the functions.
   (a) $f(x) = \frac{1}{x-1}$
       Solution: $\{x \in \mathbb{R} | x \neq 1\} = \mathbb{R} - \{1\} = (-\infty, 1) \cup (1, \infty)$
   (b) $f(x) = \frac{1}{\sqrt{x-1}}$
       Solution: $x > 1$ or $(1, \infty)$
   (c) $f(x) = \frac{\sqrt{\ln(x+1)}}{x^2-4}$
       Solution: $x \geq 0, x \neq 2$ or $[0, 2) \cup (2, \infty)$

6. Given $f(x) = \sqrt{x}$, $g(x) = \frac{1}{x+1}$ and $h(x) = \sin x$ find:
   (a) $(f + g)(x) = \sqrt{x} + \frac{1}{x+1}$
   (b) $(f \cdot g)(x) = \frac{\sqrt{x}}{x+1}$
   (c) $(f/g)(x) = (\sqrt{x})(x + 1)$
(d) \( f \circ g(x) = \frac{1}{\sqrt{x+1}} \)

(e) \( f \circ f(x) = \sqrt{\sqrt{x}} = x^{1/4} \)

(f) \( f \circ g \circ h(x) = \frac{1}{\sqrt{\sin x + 1}} \)

(g) \( f \circ h \circ g \circ f \circ g(x) = \)

7. Let \( f(x) = x^2 \). Graph on the same axes, compare: \( f(x + 1), f(x - 3), f(x) + 1 \)

8. Let \( f(x) = \sin x \). Graph on the same axes, compare: \( f(x + 1), f(x - 1), f(x) + 1 \)