Practice homework for week 1
(not all problems are from textbook)

1) #12,15,13,20 page 10
Find the domain of the following functions:
   a)  \( f(x) = \frac{x+1}{x^2-1} \)   b)  \( f(x) = \sqrt{1-x} \)   c)  \( f(x) = \frac{x}{\sqrt{1+x^2}} \)   d)  \( f(x) = \sqrt{x^2-4} \)

2) #22, 24, 26, 28 page 10
Find the composition \( f(g(x)) \):
   a)  \( f(x) = x^2 + 4 \),  \( g(x) = x - 1 \)   b)  \( f(x) = (2x + 10)^2 \),  \( g(x) = x - 5 \)
   c)  \( f(x) = \frac{1}{x} \),  \( g(x) = x^2 + x - 2 \)   d)  \( f(x) = x^2 \),  \( g(x) = \frac{1}{x-1} \)

3) #65 page 13
Find the revenue \( R(x) \) and profit \( P(x) \) functions, if the demand function (price function) \( D(x) \) and total cost function \( C(x) \) are given as following:
   \( D(x) = -0.02x + 29 \)  and  \( C(x) = 1.43x^2 + 18.3x + 15.6 \)

4) #20, 22, 23, 32, 34 page 37
Write an equation for the line that has the given properties:
   a) through (-1,2) with slope \( \frac{2}{3} \)
   b) through origin with slope 5 (Hint: origin is the point (0,0))
   c) through (2,5) and parallel to the x axis (Hint: parallel to x axis means that slope is zero)
   d) through (-2,3) and parallel to the line  \( y = -\frac{1}{3}x + 5 \)
   e) through \( \left( -\frac{1}{2}, 1 \right) \) and perpendicular to the line  \( y = -\frac{2}{5}x + 3 \)
   f) through (1,5) and (2,4)

5) #1 page 53
A farmer wishes to fence off a rectangular field with 1000 feet of fencing. If the long side of the field is along a stream (and does not require fencing), express the area of the field as a function of its width.
   Hint: look at this picture

6) #55 page 58
It costs a book publisher $74,200 to prepare a book for publication (typesetting, illustrating, editing and so on); printing and binding costs are $5.50 per book. The book is then sold to bookstores for $19.50 per copy. Write an expression representing the cost \( C(x) \), the revenue \( R(x) \) and the profit \( P(x) \) functions.
   How many books should the publisher sell to start making profit?

7) Solve the following quadratic equations
   a)  \( x^2 - 2x - 15 = 0 \)   b)  \( 9x^2 - 9x + 2 = 0 \)   c)  \( 4x^2 - 20x + 25 = 0 \)   d)  \( x^2 - 2x - 4 = 0 \)
Answer keys:

1) 
   a) \( x \neq \pm 1 \)  
   b) \( x \leq 1 \)  
   c) all \( x \)  
   d) \( x \geq 2 \) or \( x \leq -2 \)

2) 
   a) \( (x-1)^2+4=x^2-2x+5 \)  
   b) \( (2(x-5)+10)^2=4x^2 \)  
   c) \( \frac{1}{x^2+x-2} \)  
   d) \( \frac{1}{(x-1)^2} \)

3) \( R(x) = -0.02x^2+29x \), \( P(x) = -1.45x^2+10.7x-15.6 \)

4) 
   a) \( y = \frac{2}{3}(x+1)+2 = \frac{2}{3}x + \frac{8}{3} \)
   b) \( y = 5x \)
   c) \( y = 0x+5 \) which means \( y = 5 \)
   d) \( y = \frac{-1}{3}(x+2)+3 = \frac{-1}{3}x+\frac{7}{3} \)
   e) \( y = \frac{5}{2}x+\frac{5}{2}+1 = \frac{5}{2}x+\frac{9}{4} \)
   f) \( m = \frac{4-5}{2-1} = -1 \), \( y = -(x-1)+5 = -x+6 \)

5) \( A = x(1000-2x) \)

6) \( C(x) = 74200+5.5x \), \( R(x) = 19.5x \), \( P(x) = x \) \( D(x) = R(x) - C(x) = 14x - 74200 \) at least 5300 books must be sold to get profit.

7) 
   a) 5, -3  
   b) \( \frac{1}{3}, \frac{2}{3} \)  
   c) \( \frac{5}{2} \)  
   d) \( 1 \pm \sqrt{5} \)