Sample Test Questions
(Barnett, Ziegler, and Byleen)

Chapter 2  Equations and Inequalities

2-1  linear equations and applications

1. Solve the following equations for $x$:
   a. $4(x - 3) + 2 = 6$  
   
   b. $5x - (7x - 4) - 2 = 5 - (3x + 2)$  
   
   c. $\frac{x}{1 + x} = 5$  

2. What are the restricted values in the following equations? If there are no restricted values, then write NONE.
   a. $\frac{1}{1 + x} = 5$  
   
   b. $\frac{x + 2}{4 - x^2} = x + 3$  
   
   c. $\frac{x - 7}{x^2 + 4} = 5 - x$  

2-2  systems of linear equations and applications

3. Solve the following systems of linear equations. If there is not a unique solution, then write NO UNIQUE SOLUTION.
   a. $\begin{align*}
   3x + 5y &= 7 \\
   2x + y &= 0
   \end{align*}$  
   
   b. $\begin{align*}
   -x + 2y &= -1 \\
   x + 6y &= 5
   \end{align*}$  
   
   c. $\begin{align*}
   -x + 2y &= -1 \\
   3x - 6y &= 5
   \end{align*}$  

4. How many gallons of pure hydrochloric acid must be added to 10 gallons of a 25% solution to obtain a 40% solution?
5. A specialty coffee shop wishes to blend a $7-per-pound coffee with a $12-per-pound coffee to produce a blend that sells for $9 per pound. How much of each should be used to produce 100 pounds of the new blend? (10)

6. An airliner takes 1.3 times to fly from Paris to New York (3600 miles) as to return. If the cruising speed is 550 miles per hour in still air, what is the average rate of the wind blowing in the direction of Paris from New York? (10)

7. Suppose you have $10,000 to invest. If part of this is invested at 12% and the rest at 6%, then how much should be invested at each rate to yield 10% on the total amount invested? (10)

2-3 linear inequalities

8. Solve each of the following inequalities for $x$ and write the solution in inequality notation as well as interval notation and graph the solution:
   a. $6x + 8 > 3x - 7$ (5)
   b. $-12 < 7 - 2x \leq 11$ (10)
   c. $6x + 7 \leq 3x - 1$ (5)

9. For the expression to have a real value, what are the restricted values for $x$ in each of the following?
   a. $\frac{1}{x}$ (5)
   b. $\sqrt{x - 2}$ (5)

2-4 absolute value in equations and inequalities

10. Solve the following equation for $x$:
    $$2|x+3| - 7 = 13$$ (5)

11. Solve each of the following inequalities for $x$ and write the solution in inequality notation as well as interval notation and graph the solution:
    a. $|5x+3| < 8$ (10)
    b. $|x+1| \geq 5$ (10)

12. Write an expression that expresses each of the following:
    a. $x$ is closer than 3 units from 5 (3)
    b. $x$ is closer than 5 units from $-2$ (3)
    c. $x$ is further than 2 units from 1 (3)
d. $x$ is no further than 4 units from 9  

2-5 **complex numbers**

13. Perform the indicated operations and write the answer in standard form:
   a. $i^5$  
   b. $(3-5i) + (4+2i)$  
   c. $(11+3i) - (7-2i)$  
   d. $(7-2i)(-3+4i)$  
   e. $\frac{3+2i}{3+2i}$  
   f. $\frac{2-31}{4+3i}$

2-6 **quadratic equations and applications**

14. Solve each of the following for $x$:
   a. $x^2 = 3x$  
   b. $x^2 = 4x - 1$  
   c. $x^2 - 2x + 2 = 0$  
   d. $\frac{1-x}{1+x} = 3$  
   e. $x^2 - 5x + 6 = 0$  
   f. $x^2 + 6x + 9 = 0$  
   g. $3x^2 - 6x - 9 = 0$

15. Find the base $b$ and the height $h$ of a triangle with an area of 2 ft² if its base is 3 ft longer than its height.
2-7  *equations reducible to quadratic form*

16. Solve each of the following for $x$:

a. $x^4 + 3x^2 - 5 = 0$  

b. $2(x+3)^2 + 6(x+3) - 5 = 0$  

c. $\sqrt{11x - 6} - x - 1 = 0$  

d. $x^6 + x^3 - 4 = 0$