ALGEBRA PROBLEM SESSION # 2 PRACTICE PROBLEMS

Introduction to Functions

- 1. Explain in your own words what a function is.
- 2. Determine whether (2, 3), (2, 4) and (2, 5) is a function. 3. Determine whether (0, 3), (1, 3) and (2, 3) is a function.
- 4. If $P(x) = x^2 5x$, is P(2) + P(3) = P(2 + 3)? 5. If $P(x) = x^2 3x$, is P(2) P(3) = P(2 3)?
- 6. If $P(x) = x^2 2x 3$, find P(0). 7. If $P(x) = 2x^2 - x - 5$, find P(-1).
- 8. Given that $f(x) = 4x^2 + x 7$, find each of the following. Then discuss how each expression differs from the other: (a) f(x) + 2 (b) f(x + 2) (c) f(x) + f(2)
- 9. Is it ever true that for $f(x) = 4x^2 + x 7$, f(a + b) = f(a) + f(b)? If so, give an example of such a and b.
- 10. Suppose that for some function f, f(x 1) = 5x. Find f(6).

Graphs of Functions

1. Discuss why the graph of a vertical line x = a cannot represent y as a function of x.

- 2. Explain why the vertical line test for determining if the graph of a relation is a function works.
- 3. Graph $f(x) = x^2$, $f(x) = 2x^2$, and $f(x) = 4x^2$. What do you discover?
- 4. Graph $f(x) = x^2$, $f(x) = \frac{1}{2}x^2$, and $f(x) = \frac{1}{4}x^2$. What do you discover?
- 5. Graph y = mx 1 for m = -2, -1, 0, 1, and 2 simultaneously in the same coordinate system. Verbally describe the geometric significance of *m*.
- 6. Compare the graph of f(x) = |x| with that of g(x) = x.
- 7. A cab company charges \$2 for a trip up to 1 mile, and \$1.50 for every extra mile (or portion of a mile). Draw a graph representing the cost (c) of a trip as a function of miles (m) traveled.
- 8. Graph f(x) = 2x and g(x) = 2x 19. Graph f(x) = |x| and g(x) = |x| + 110. Graph $f(x) = x^2$ and $g(x) x^2 - 4$

Working with Functions

1. If a function is defined by an equation, explain how to find its domain.

- 2. Find the domain of $f(x) = \frac{12x}{x-5}$ 3. Find the domain of $f(x) = \frac{2}{x+5} + \frac{3}{x-7}$
- 4. Find (f + g)(x) and (f + g)(4) when f(x) = 2x 3 and $g(x) = 3x^2$.
- 5. Find the domain of f + g when f(x) = 7x + 4 and $g(x) = \frac{2}{x-6}$.

6. When $f(x) = x^2 + 1$ and $g(x) = x^3 - 1$, find the domain and range of: (a) f(x) = 4x - 1 b. $f(x) = \frac{4}{2 - r}$

- 7. If $f(x) = x^2 + 2x$ and g(x) = 3 x find:c. f(-4) + g(-5)b. (f g)(x) and (f g)(4)c. (fg)(-3)d. (f/g)(-2)
- 8. Let f(x) = 2x + 1 and $g(x) = x^2$. Assume that $f(x) \neq 0$ and $g(x) \neq 0$. Is f(x) + g(x) equal to g(x) + f(x)? Is f(x) g(x) equal to g(x) f(x)?
- 9. For the indicated functions f and g, find the functions f + g, f g, fg, and f/g and find their domains.

$$f(x) = x + \frac{1}{x} \quad g(x) = x - \frac{1}{x} \qquad f(x) = x - 1 \quad g(x) = x - \frac{6}{x - 1} \qquad f(x) = 1 - \frac{x}{|x|} \qquad g(x) = 1 + \frac{x}{|x|}$$

Selected problems were taken from Blitzer Algebra For College Students