

Mat 115 Worksheet- Lesson# 8(Linear Function)  
Mathematics, Engineering and Computer Science Department

1. Identify which of the following functions are linear.

$$(a) f(x) = \frac{1}{x} \qquad (b) f(x) = 7 - 5x^2 \qquad (c) f(x) = -2x + 7$$
$$(d) f(x) = x^3 \qquad (e) g(x) = \pi - 3x \qquad (f) h(x) = x$$

2. Compute the average rate of change of  $f$  over the indicated interval

$$(a) f(x) = 7x - 5 ; [-2,2] \qquad (b) f(x) = -3x - 5 ; [-1,2] \text{ and } [2,3]$$

3. Show that the rate of change of the linear function  $f(x) = ax + b$  is the constant  $a$ .

4. If  $f(2) = 5$  and  $f(-1) = -3$ , find  $a$  and  $b$  in the function  $f(x) = ax + b$

5. Graph the following function. Identify the  $x$ -intercept and  $y$ -intercept. Also define the domain and range of each function.

$$(a) f(x) = -2x + 1 \qquad (b) f(x) = 4 + x \qquad (c) f(x) = 0.5x - 1.5$$

6. Let  $f(x) = 2x + 1$  and  $g(x) = \frac{x-1}{2}$ . Find

$$(a) f(g(3))$$
$$(b) g(f(3))$$
$$(c) f(g(x))$$
$$(d) g(f(x))$$

7. Suppose  $f$  is defined as  $f(x) = 2x - 3$ . Solve for  $x$  in the inequality below.

$$|f(x) - 5| \leq 0.0001$$

8. The value of a 2009 Mustang, in thousands of dollars, is a function of the age  $x$  of the car, in years. Let  $V = f(x)$  be the function that represents the value of the car when it is  $x$  years old. Assume  $V$  is a linear function.

- (a) Interpret the equation  $f(2) = 27$  in practical terms.  
(b) If the Mustang was bought for \$35,000 in 2009, find a formula for  $V$ .  
(c) Graph  $V$  against  $x$   
(d) Explain the meaning of the intercepts.  
(e) What was the value of the car in 2012, based on this model?  
(f) What does the car worth today?  
(g) In what year did the car worth \$20,000?