REVIEW TEST 1 - Chapters 1, 2, 3.1, 3.2 & 9.2

Optional @ 10 points towards Test 1 – Due Thursday

Solve the following exercises: #5 - Textbook (all); #9b, #10c, #13a, #16 – Textbook (all)

CHAPTER 1
Handout: Review Chapter 1 – Exercises # 5, 6, 12, 13   (see website for handout).

CHAPTER 2 & 9.2
Functions and Algebra of Functions

1) Which of the following tables define the second variable as a function of the first variable? Explain why or why not.

X	t
-1	2
0	9
1	-2
0	-3
-1	5

Adjusted gross income (I)	Tax bracket (T)
0 – 2479	0%
2480 – 3669	11%
3670 – 4749	12%
4750 – 7009	14%
7010 – 9169	15%
9170 – 11,649	16%
11,650 – 13,919	18%

Temperature (T)	Humidity (h)
Jan.1 $34^o\,F$	42%
Jan.2 $36^o\,F$	44%
Jan 3 $35^o\,F$	47%
Jan 4 $29^o\,F$	50%
Jan5 $31^o\,F$	52%
Jan.6 $35^o\,F$	51%
Jan.7 $34^o\,F$	49%

2)
a) What is the definition of a function?
b) Give an example of a function (use function notation):
c) What is the domain of a function (the definition) ? In particular, what is the domain of your function (your example from part b) ?
d) What is the definition of a one-to-one function?

3) Let $f(x)=\dfrac{5}{(x-2)^2}$, $g(x)=\dfrac{1}{36x^3}$, $G(x)=\sqrt{7x-9}$, and $h(x)=\dfrac{7x+3}{4(1-x)}$.

Find the following and simplify (don't give approximate answers) :

a) The domain of each function.   b) $g(a+1)$, $g(a)+1$, $h\left(\dfrac{5}{7}\right)$, $f(x+2)$, and $h(x-1)$

4) Let $f(x)=\begin{cases}1-x^2, x\le 0\\ 2x+1, x>0\end{cases}$. a) Evaluate $f(-2)$ and $f(1)$.

5) Textbook: Section 2.1 # 17, 49, 51, 53, 55, 57, 65, 67, 43 , 45, 47
                 Section 2.2 # 29 – 43 odd, 49, 51
                 Section 9.2 # 45, 47, 49, 61 – 67 odd, 75

6) If $f(x)=x^2+2x-1$ and $g(x)=2x-3$, find each of the following:

a) what is the domain of f and g;   b) What is the range of g?   c) $f\circ g$ and $g\circ f$;
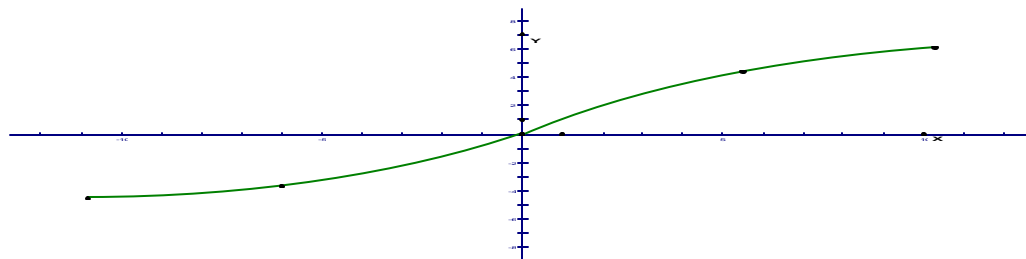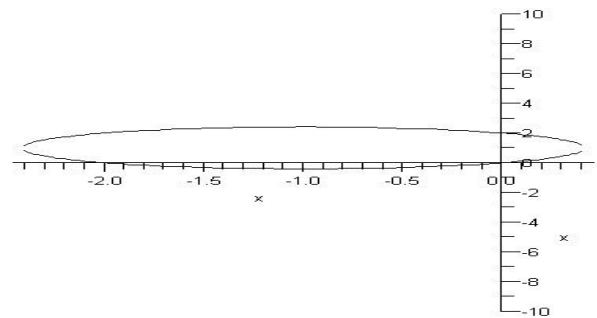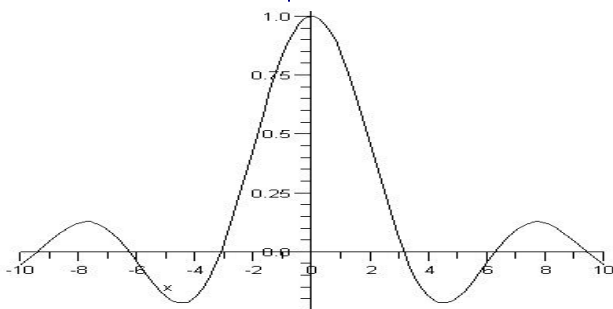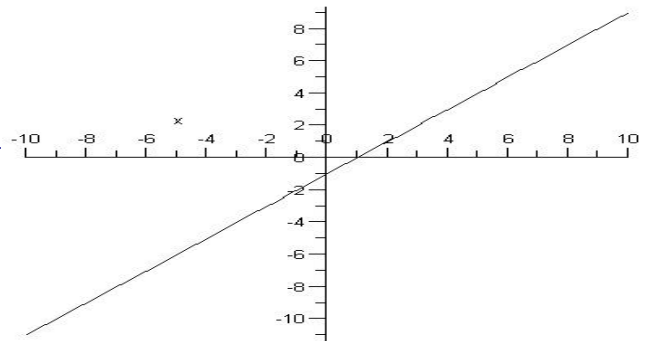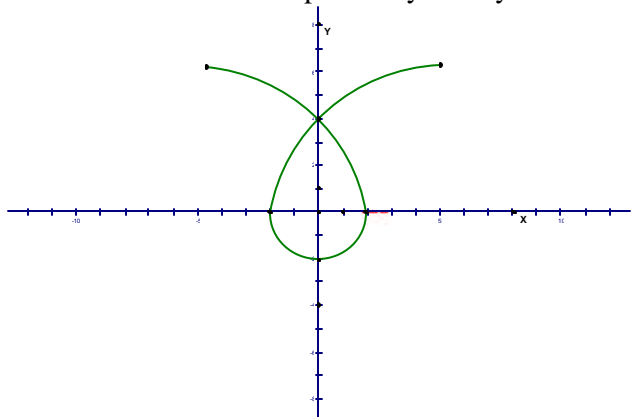
d) $f(g(2))$;   e) Does g have an inverse ? Explain.

f) Find g^{-1} and its domain and range;

7) Which of the graphs represent y as a function of x? Explain why or why not. Which of the functions are one-to-one functions? Explain why or why not.

8) The value of a stock varies during the course of any trading day. The price per share "P" of a certain stock is shown on the graph below for a particular trading day. Note "t" represents any time between 8 am and 2 pm.
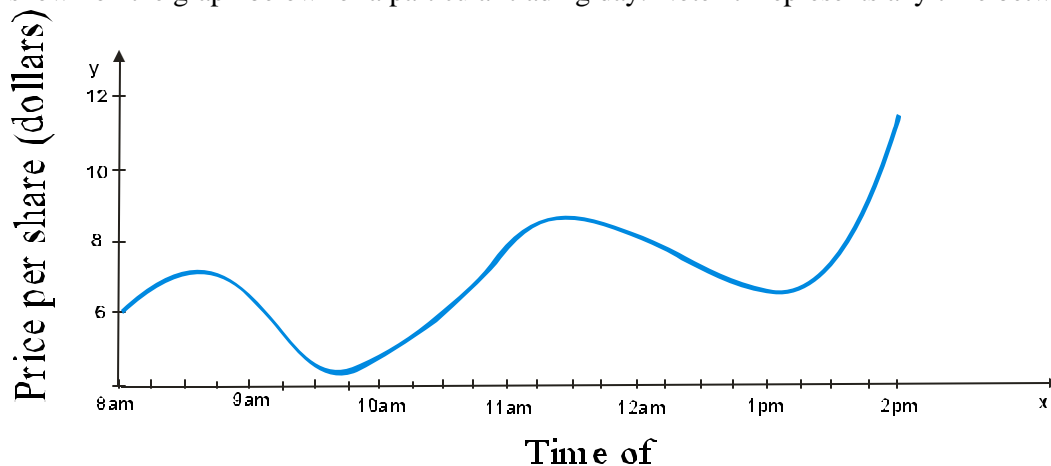
a) Is "t" (the time of the day) a function of "P" (the price per share)? Is "P" a function of "t"? Explain using the definition of function.

Using the graph, estimate the answers to the following questions (Use the correct units).

b) What is the domain? What is the range?

c) For what value(s) of "t" does P(t)=8 and what does it mean in practical terms?

d) What is P(11) and what does it mean in practical terms?

e) For what value(s) of "t" is P(t) >5.50?

9) Find $f + g, f - g, fg,$ and f/g:

a) $f(x) = \dfrac{1}{x+1},\ g(x) = \dfrac{x}{x+1}.;$ 　　　b) $f(x) = x^3 + 2x^2, g(x) = 3x^2 - 1$

10) Find: $f \circ g$ and $f \circ f$:

a) $f(x) = 2x + 3, g(x) = 4x - 1;$ 　　b) $f(x) = \sqrt[3]{x}, g(x) = 1 - \sqrt{x};$ 　c) $f(x) = \dfrac{1}{x+1}, g(x) = \dfrac{x-1}{x+1}$

11) Use $f(x) = 3x - 5, g(x) = 2 - x^2$ to evaluate the expressions: $(f \circ g)(0), g(g(3))$

12) Assume f is one-to-one. a) If $f(2) = 7$, find $f^{-1}(7)$; b) $f^{-1}(3) = -1$, find $f(-1)$.

13) Use the property of inverse functions to show that f and g are inverses of each other:

a) $f(x) = 2x - 5, g(x) = \dfrac{x+5}{2}$; b) $f(x) = x^2 - 4, x \geq 0$, $g(x) = \sqrt{x+4}, x \geq -4$.

14) Find the inverse of each function: $f(x) = 2x + 1$, $g(x) = \dfrac{1}{x+2}$, $h(x) = \sqrt{2 + 5x}$, $F(x) = \dfrac{2x-3}{1-5x}$

15) Handout: Sections 2.3 & 2.4 – Equations of lines: Exercises # 4, 5, 7 , 8, 9, 10, 11(see website for handout)

16) CHAPTER 3
Textbook: 　　Section 3.1 - # 63, 66, 69, 78, 80, 84
　　　　　　　　Section 3.2 - # 6, 11, 13, 20, 23, 26, 27, 30

Answers
Chapter 2:
(1) 2nd;

(3) a) $D_g = \mathbb{R} \setminus \{0\}, D_h = \mathbb{R} \setminus \{1\}$; b) $g(a) + 1 = \dfrac{1 + 36a^3}{36a^3}$, $g(a+1) = \dfrac{1}{36(a+1)^3}$;

(4) $f(-2) = -3$, $f(1) = 3$;

(6) a) all real numbers; b) all real numbers; d) 1; e) yes, it's one-to-one; f) $g^{-1}(x) = \dfrac{x+3}{2}$;

(7) $2^{nd}, 3^{rd},$ and 5th represent y as a function of x. Only 2nd and 5th are one-to-one;

(10) b) $(f \circ g)(x) = \sqrt[3]{1 - \sqrt{x}}$, $(f \circ f)(x) = \sqrt[9]{x}$; c) $(f \circ g)(x) = \dfrac{x+1}{2x}$;

11) 1, -45;
13) Hint: Must show that $(f \circ g)(x) = x$ and $(g \circ f)(x) = x$;

(14) $g^{-1}(x) = \dfrac{1}{x} - 2$, $h^{-1}(x) = \dfrac{x^2 - 2}{5}$, $F^{-1}(x) = \dfrac{x+3}{5x+2}$

Chapter 3: Section 3.1 – (66) (8,2); (78) no solution; (80) an infinite number of solutions (lines coincide); (84) (8, -1); **Section 3.2** – (6) a) 750 units, $24,000; b) P(x)=20x-15,000; (20) 16% gold: 8 oz, 28% gold: 24 oz; (26) 3 dimes and 12 quarters; (30) 21 mph for boat, 3mph for current;