ST LOS ANGELES COLLEGE NAME: Key

MATHEMATICS 125 TEST CHAPTER 7 --- FALL 2004
INSTRUCTOR: ANNE SISWANTO; TOTAL POINTS: 100; TIME: 70 MINUTES

DIRECTION: SHOW ALL WORK ON THE PAPER TO GET FULL CREDIT. ONLY SCIENTIFIC CALCULATORS (NOT GRAPHING CALCULATORS) ARE PERMITTED.

QUESTION 1 (16 POINTS)

Let $g(x) = \dfrac{1}{x+4}$ and $h(x) = x - 7$. Find the following.

a. <2> $g(0) = \frac{1}{0+4} = \underline{\underline{\frac{1}{4}}}$

b. <2> $h(-3) = -3-7 = \underline{\underline{-10}}$

c. <2> $g(2a) = \underline{\underline{\frac{1}{2a+4}}}$

d. <2> $(g \cdot h)(-1) = g(-1) \cdot h(-1)$
$= \frac{1}{-1+4} \cdot (-1-7)$
$= \frac{1}{3}(-8) = \underline{\underline{-\frac{8}{3}}}$

e. <2> The domain of g.
$\{x \mid x \neq -4,\ x \in \mathbb{R}\}$

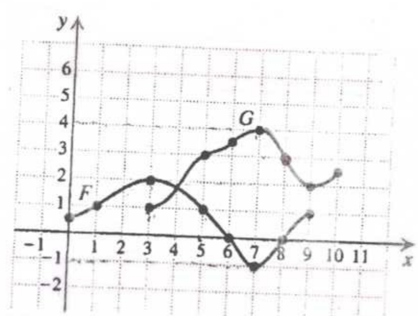
f. <2> The domain of h.
$\{x \mid x \in \mathbb{R}\}$

g. <2> The domain of $g + h$.
$\{x \mid x \neq -4,\ x \in \mathbb{R}\}$

h. <2> The domain of g / h.
$\{x \mid x \neq -4,\ x \neq 7,\ x \in \mathbb{R}\}$

QUESTION 2 (12 POINTS)

Use following graphs of F and G.



a. <2> Determine $(F+G)(7)$. $= F(7) + G(7)$
$= -1 + 4 = \underline{\underline{3}}$

b. <2> Determine $(F \cdot G)(9)$. $= F(9) \cdot G(9)$
$= 1 \cdot 2 = \underline{\underline{2}}$

c. <2> Determine $(G - F)(3)$. $= G(3) - F(3)$
$= 1 - 2 = \underline{\underline{-1}}$

d. <2> any x-value for which $F(x) = 2$.
$x = \underline{\underline{3}}$

e. <2> Find the domain and range of F.
domain of $f = \{x \mid 0 \leq x \leq 9,\ x \in \mathbb{R}\}$
range of $f = \{y \mid -1 \leq y \leq 2,\ y \in \mathbb{R}\}$

f. <2> Find the domain and range of G.
domain of $g = \{x \mid 3 \leq x \leq 10,\ x \in \mathbb{R}\}$
range of $g = \{y \mid 1 \leq y \leq 4,\ y \in \mathbb{R}\}$

QUESTION 3 (6 POINTS)

$$f(x)=\begin{cases}2x^2-3, & \text{if } x\le 2\\ x^2, & \text{if } 2<x<4\\ 5x-7, & \text{if } x\ge 4\end{cases}$$

a. <2> Find $f(0)$ $= 2(0)^2 = \underline{\underline{0}}$

b. <2> Find $f(3)$ $= 3^2 = \underline{\underline{9}}$

c. <2> Find $f(6)$ $= 5(6) - 7 = \underline{\underline{23}}$

QUESTION 4 (10 POINTS)

Graph the following functions.

a. <5> $f(x) = -\frac{1}{4}x + 6$

$y = -\frac{1}{4}x + 6$

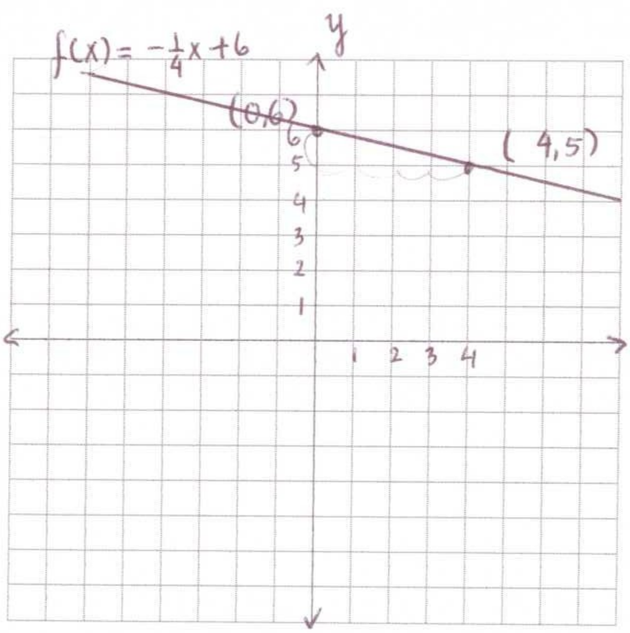
$\Rightarrow m = -\frac{1}{4}$

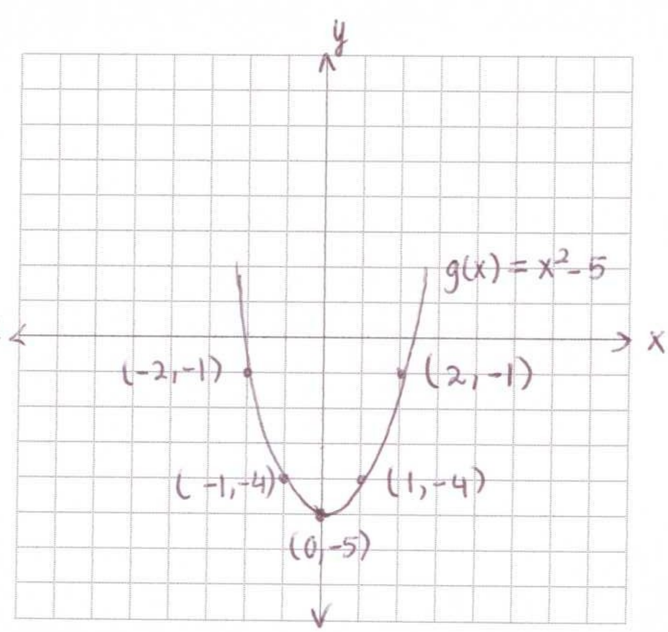
$\underline{\underline{\text{y-intercept } (0,6)}}$

b. <5> $g(x) = x^2 - 5$

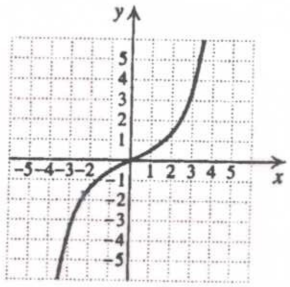
$y = x^2 - 5$ by plotting points

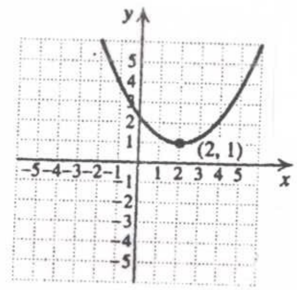
x	$y = x^2 - 5$
-2	-1
-1	-4
0	-5
1	-4
2	-1





QUESTION 5 (6 POINTS)
For each of the following graph
a. <3> Determine if the graph represent a function
b. <3> If yes, determine the domain and range of the function.





Yes, a function by vertical Line test
Domain = $\{x \mid x \in \mathbb{R}\}$
Range = $\{y \mid y \geq 1, y \in \mathbb{R}\}$

Yes, it is a function by vertical line test. Domain = $\{x \mid x \in \mathbb{R}\}$, Range = $\{y \mid y \in \mathbb{R}\}$

QUESTION 6 (10 POINTS)
It costs $75 plus $15 a month to join Total Fitness Center.
a. <5> Formulate a linear function $C(t)$ to model the cost for t months of membership.

$$C(t) = 75 + 15t$$

b. <5> Determine the time required for the cost to reach $180.

$C(t) = 180 \Rightarrow 180 = 75 + 15t$
$105 = 15t$
$7 = t$

$\therefore$ It takes 7 months to reach $180

QUESTION 7 (10 POINTS)
In 1955, the U.S. minimum wage was $0.75, and in 1997, it was $5.15. Let W represent the minimum wage, in dollars, t years after 1955.
a. <5> Find a linear function $W(t)$ that fits the data.

year 1955 → $t = 0$, wage \$ 0.75 $(0, 0.75)$
1997 $t = 42$, wage \$ 5.15 $(42, 5.15)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5.15 - 0.75}{42 - 0} = 0.1048$$

$$y = mx + b \Rightarrow y = 0.1048x + 0.75$$

$$W(t) = 0.1048t + 0.75$$

b. <5> Use the function in part (a.) to predict the minimum wage in 2005.

year 2005 → $t = 50$

$W(50) = 5.988 \approx \$5.99$

$\therefore$ Min. wage is $5.99 in 2005

QUESTION 8 (30 POINTS)

Solve the following **variation** problems by first finding k, the variation constant, the equation, and then answer the question. SHOW ALL WORK ON THE PAPER.

a.<10> The weight M of an object on Mars varies directly as its weight E on earth. A person who weighs 95 lb on Earth weighs 38 lb on Mars. How much would a 120-lb person weigh on Mars?

Given: $M = kE$, If $E = 95$, $M = 38$

If $E = 120$, Find M

Soln: $M = kE$

$38 = k\,95$

$\frac{38}{95} = k$

$0.4 = k$

$\boxed{M = 0.4E}$

$M = 0.4(120)$

$M = 48$

∴ The 120-lb person weighs 48 lb on Mars

b.<10> The current I in an electrical conductor varies inversely as the resistance R of the conductor. If the current is $\frac{1}{2}$ ampere when the resistance is 240 ohms, what is the current when the resistance is 540 ohms?

Given: $I = \frac{k}{R}$, If $I = \frac{1}{2}$, $R = 240$

Find: I when $R = 540$

Soln: $I = \frac{k}{R}$

$\frac{1}{2} = \frac{k}{240}$

$2k = 240$

$k = 120$

$\boxed{I = \frac{120}{R}}$

$I = \frac{120}{540}$

$I = \frac{2}{9}$

∴ The current is $\frac{2}{9}$ Amperes. when the resistance is 540 ohms

c. <10> The volume V of a given mass of a gas varies directly as its temperature T and inversely as the pressure P. If $V = 231\ cm^3$ when $T = 21^o$ and $P = 10\ kg/cm^2$, what is the volume when $T = 60^o$ and $P = 15\ kg/cm^2$?

Given: $V = \frac{kT}{P}$, If $V = 231$ and $T = 21$, $P = 10$

Find: If $T = 60$ and $P = 15$, find V

Soln: $V = \frac{kT}{P}$

$231 = \frac{k \cdot 21}{10}$

$21k = 2310$

$k = 110$

$\boxed{V = \frac{110T}{P}}$

$V = \frac{110(\cancel{60})^{4}}{\cancel{15}}$

$V = 440$

∴ The volume is 440 cm^3 when the temperature is 60° and the pressure is 15 $\frac{kg}{cm^2}$