Math 71 – Spring 2008 Name:

QUIZ #1 @ 50 points

Write in a neat and organized fashion. Write your complete solutions on SEPARATE PAPER. You should use a pencil. For an exercise to be complete there needs to be a detailed solution to the problem. Do not just write down an answer. No proof, no credit given! Clearly label each exercise.

1. Solve the following equations:

a) $2t-4(1-3t)=t+15$

b) $\frac{x}{2}-\frac{1}{10}=\frac{x}{5}+\frac{1}{2}$

c) $\frac{2a-1}{2}-\frac{3a-1}{3}=\frac{4a-1}{4}$

d) $0.8(0.3p-0.5)=0.8$

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2. Solve each equation for the specified variable:

a) $V=\frac{1}{3}Bh$ for h.

b) $E=I(R+r)$ for r.

c) $s=vt+gt^2$ for g.

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3. Let $f(x)=\frac{x+2}{x-4}$ be a function. Answer the following questions:

a) What is the domain of the function?

b) Find $f(0), f(-1), f(-x)$.

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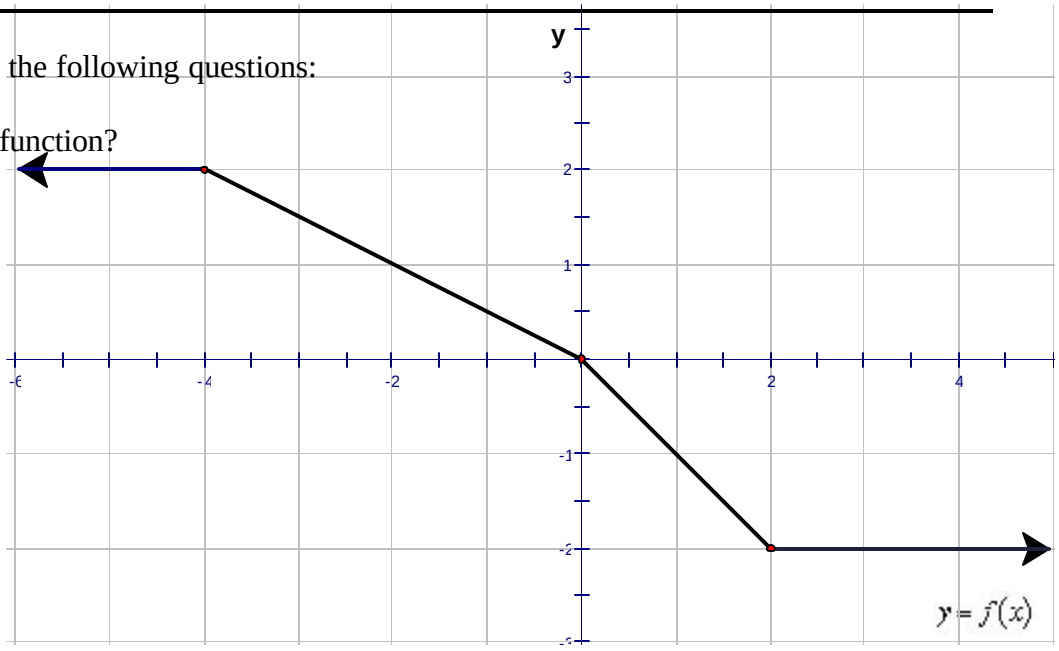
4. A graph is shown. Answer the following questions:

a)Does the graph represent a function? Why?

b) Find $f(-4), f(2), f(4)$.

c) What is the domain of the function?

d) What is the range of the function?



5. Let $f(x)=2x+3$ and $g(x)=1-x$ be two functions. Find the following and simplify:

a) $(f+g)(x)$

b) $(f+g)(2)$

c) $(f-g)(1)$

d) $(fg)(x)$

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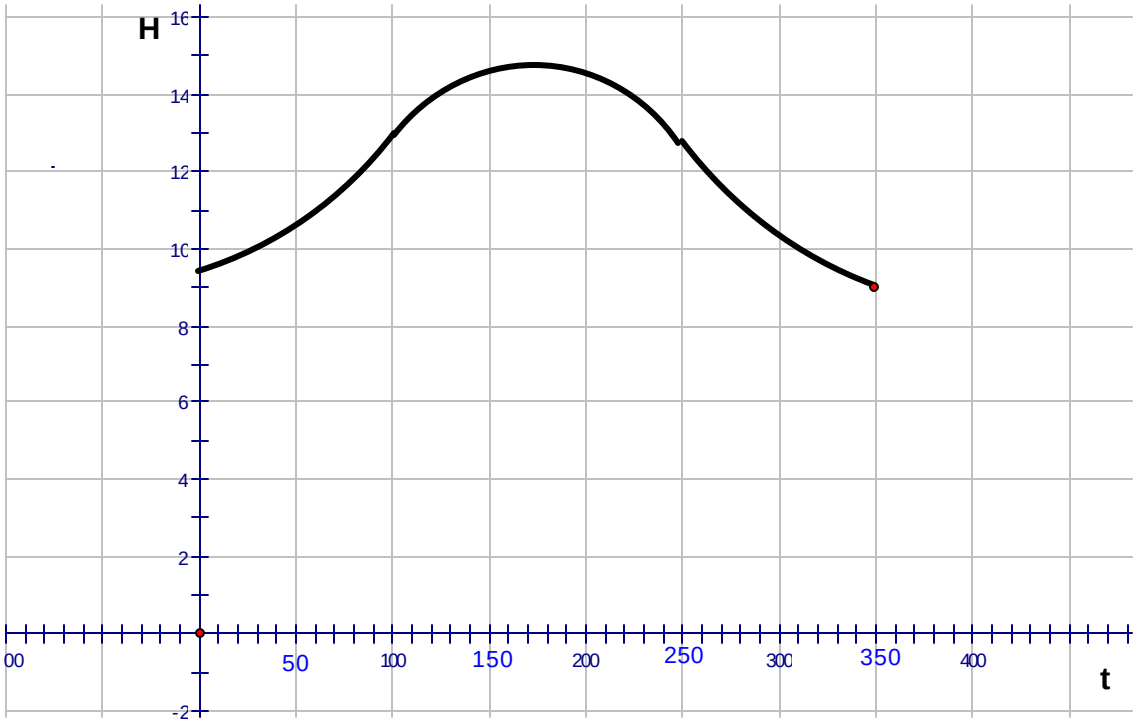
6. The figure shows the number of hours, *H*, that the sun is above the horizon in Peoria, Illinois, on day *t*, where January 1 corresponds to $t=0$.



a) Which variable is independent, and which is dependent?

b) Approximately how many hours of sunlight are there in Peoria on day 150?

c) On which days are there 12 hours of sunlight?

d) What are the maximum and minimum values of H, and when do these values occur?

MATH 71

QUIZ #1 - SOLUTIONS

(1) (a) $2t-4(1-3t) = t+15$

$2t-4+12t = t+15$

$14t-4 = t+15$

$14t-t = 15+4$

$13t = 19$

$\boxed{t = \frac{19}{13}}$

(b) $\frac{5}{\frac{x}{2}} - \frac{1}{10} = \frac{2}{\frac{x}{5}} + \frac{5}{\frac{1}{2}}$

$LCD = 10$

$5x-1 = 2x+5$

$5x-2x = 5+1$

$3x = 6$

$\boxed{x = 2}$

(c) $\frac{6}{\frac{2a-1}{2}} - \frac{4}{\frac{3a-1}{3}} = \frac{3}{\frac{4a-1}{4}}$

$LCD = 12$

$6(2a-1) - 4(3a-1) = 3(4a-1)$

$12a-6-12a+4 = 12a-3$

$-2 = 12a-3$

$3-2 = 12a$

$1 = 12a$

$\boxed{a = \frac{1}{12}}$

(d) $0.8(0.3p-0.5) = 0.8 \quad / \cdot 100$

$8(3p-5) = 80$

$24p-40 = 80$

$24p = 120$

$\boxed{p = 5}$

(2) (a) $V = \frac{1}{3}Bh$ for h

$3V = Bh$

$\boxed{h = \frac{3V}{B}}$

(b) $E = I(R+r)$ for r

$R+r = \frac{E}{I}$

$\boxed{r = \frac{E}{I} - R}$ or $r = \frac{E-RI}{I}$

(c) $s = vt + gt^2$ for g

$s-vt = gt^2$

$\boxed{g = \frac{s-vt}{t^2}}$

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(3) $f(x) = \frac{x+2}{x-4}$

(a) Condition: $x-4 \neq 0$

$x \neq 4$

$\boxed{\text{Domain} = \mathbb{R} \setminus \{4\}}$

(b) $f(0) = \frac{0+2}{0-4}$

$= \frac{2}{-4}$

$= -\frac{1}{2}$

$\boxed{f(0) = -\frac{1}{2}}$

$f(-1) = \frac{-1+2}{-1-4} = \frac{1}{-5}$

$\boxed{f(-1) = -\frac{1}{5}}$

$\boxed{f(-x) = \frac{-x+2}{-x-4}}$ or $f(x) = \frac{x-2}{x+4}$

(4) (a) Yes, because it passes the vertical line test (any vertical line has at most one common point with the graph)

(b) $f(-4) = ?$ $x = -4$, $y = ?$ $\boxed{f(-4) = 2}$

$f(2) = ?$ $x = 2$, $y = ?$ $\boxed{f(2) = -2}$

$f(4) = ?$ $x = 4$, $y = ?$ $\boxed{f(4) = -2}$

(c) Domain: $\boxed{x \in \mathbb{R}}$

(d) Range: $\boxed{y \in [-2, 2]}$

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(5) $f(x) = 2x + 3$

$g(x) = 1 - x$

(a) $(f+g)(x) = f(x) + g(x)$

$= (2x+3) + (1-x)$

$= x + 4$

$\boxed{(f+g)(x) = x + 4}$

(b) $(f+g)(2) = 2 + 4$

$\boxed{(f+g)(2) = 6}$

(used (a))

(c) $(f-g)(1) = f(1) - g(1)$

$= (2 \cdot 1 + 3) - (1 - 1)$

$= 5 - 0 = 5$ $\boxed{(f-g)(1) = 5}$

(d) $(fg)(x) = f(x)\,g(x)$

$= (2x+3)(1-x)$

$= 2x - 2x^2 + 3 - 3x$

$\boxed{(fg)(x) = -2x^2 - x + 3}$

(6) t = # days

H = # hours the sun is above the horizon

(a) t = independent variable (input)

H = dependent variable (output)

(b) when $t = 150$, $H = ?$

$H \approx 14.5$ hours

(c) when $H = 12$ hr, $t = ?$

$t \approx 80$ days or

$t \approx 270$ days

(d) $H_{max} \approx 15$ hrs on $t \approx 175$ days

$H_{min} \approx 9$ hrs on $t \approx 350$ days