Math 71 Spring 2007 QUIZ #1 @ 50 points Name:

Write in a neat and organized fashion. 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.

1. Solve the following equations:

a) $\frac{x}{4} = 2 + \frac{x-3}{3}$ $\quad LCD = 12$

$3x = 24 + 4(x-3)$
$3x = 24 + 4x - 12$
$3x = 12 + 4x$
$-12 = 4x - 3x$
$x = -12$

b) Solve the equation for b: $A = \frac{1}{2}h(a+b)$ $\quad \cdot 2$

Method I
$2A = h(a+b)$
$2A = ha + hb$
$2A - ha = hb$
$b = \frac{2A - ha}{h}$

OR

Method II
$2A = h(a+b)$
$a + b = \frac{2A}{h}$
$b = \frac{2A}{h} - a$

2. Simplify the following expression. Write the final answer with positive exponents.

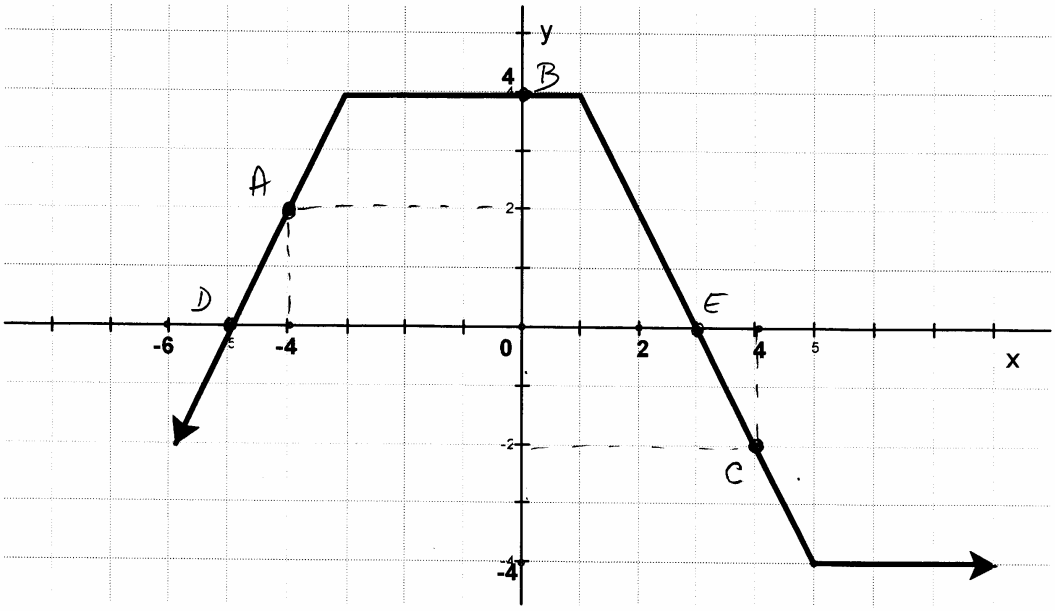
$$\left(\frac{3a^{-5}b^{2}}{12a^{3}b^{-4}}\right)^{-2} = \left(\frac{1}{4}a^{-5-3}b^{2-(-4)}\right)^{-2}$$
$$= \left(\frac{1}{4}a^{-8}b^{6}\right)^{-2}$$
$$= \left(\frac{1}{4}\right)^{-2}\left(a^{-8}\right)^{-2}\left(b^{6}\right)^{-2}$$
$$= \frac{1}{4^{-2}}a^{16}b^{-12} = \frac{16a^{16}}{b^{12}}$$

3. Find the slope for a line that is
   a) parallel to the line with the given equation;
      and
   b) perpendicular to the line with the given equation.

$2x + 4y - 7 = 0$
$4y = -2x + 7 \quad / \div 4$
$y = \frac{-2}{4}x + \frac{7}{4}$
$y = \frac{-1}{2}x + \frac{7}{4}$
$m = \frac{-1}{2}$

Therefore, $m_{\parallel} = \frac{-1}{2}$, $m_{\perp} = 2$

4. Answer the following questions:



a) Is y a function of x? Explain.

y is a function of x because the graph passes the vertical line test (for every x, there is only one y)

b) What is the domain of the function?

$x \in \mathbb{R}$

c) What is the range of the function?

$y \in (-\infty, 4]$

d) If $y = f(x)$, find:

$f(-4) = 2$ (pt A $(-4,2)$)
($x=-4$, $y=?$)

$f(0) = 4$ (pt B $(0,4)$)
($x=0$, $y=?$)

$f(4) = -2$ (pt C $(4,-2)$)
($x=4$, $y=?$)

e) Solve $f(x) = 0$
($y=0$, $x=?$)

$x = -5$ or $x = 3$ (pts D $(-5,0)$, E $(3,0)$)

5. $f(x)=\dfrac{2x-3}{x-4}$

a) What is the domain of the function?

Condition: $x-4\neq 0$

$x\neq 4$

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

b) Find $f(0)$

$f(0)=\dfrac{2(0)-3}{0-4}$

$f(0)=\dfrac{-3}{-4}$

$f(0)=\dfrac{3}{4}$

c) Find $f(a+h)$

$f(a+h)=\dfrac{2(a+h)-3}{a+h-4}$

$f(a+h)=\dfrac{2a+2h-3}{a+h-4}$

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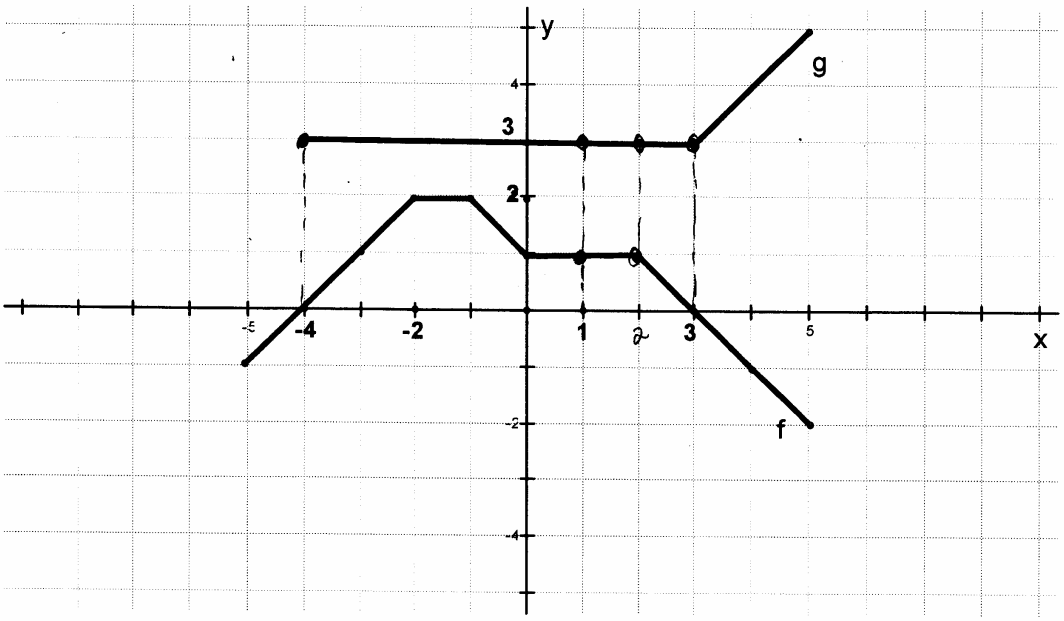
6. Use the graphs of f and g to answer the following:



a) $(f+g)(-4) = f(-4)+g(-4)$

$= 0+3$

$= 3$

b) $(fg)(3) = f(3)\cdot g(3)$

$= 0\cdot 3$

$= 0$

c) $\left(\dfrac{f}{g}\right)(1) = \dfrac{f(1)}{g(1)}$

$= \dfrac{1}{3}$

d) $(f-g)(2) = f(2)-g(2)$

$= 1-3$

$= -2$

7. The linear function $f(x) = 2x + 24$ models the average cost in dollars of a retail drug prescription in the United States, $f(x)$, x years after 1991.

a) What was the average cost in dollars of a drug prescription in 1995?

1995: $x = 4$

$f(4) = 2(4) + 24$

$f(4) = 32$

The average cost of a drug prescription in 1995 was \$32

b) Find the slope of the model and describe what it means in terms of the rate of change of the dependant variable per unit change in the independent variable.

$f(x) = 2x + 24$

$m = 2\ \$/yr$ shows the rate at which the average cost of a retail drug prescription has increased per year since 1991 rate = \$2/yr

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8. A computer store budgets \$12,000 to buy computers and laser printers. Each computer costs \$650 and each printer costs \$200.

a) Write an equation that models the given situation. Define the variables.

let x = the number of computers cost = \$650/unit

y = the number of printers cost = \$200/unit

$$650x + 200y = 12{,}000$$

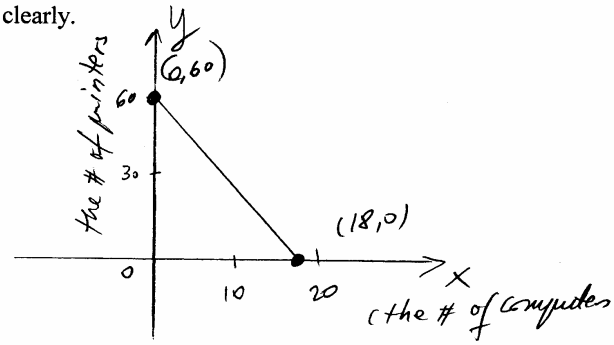
b) Sketch the graph. Be sure to label the axes clearly.

$650x + 200y = 12{,}000$

x	y
0	60
18	0

$x = 0,\ y = \frac{12000}{200} = 60$

$y = 0,\ x = \frac{12{,}000}{650} \approx 18$



c) What is the significance of the intercepts?

x-int: (18,0) it shows the # of computers bought if no printers are bought.
(The store can buy 18 computers if it buys no printers)

y-int: (0,60) it shows the # of printers bought if no computers are bought
(The store could buy 60 printers if it buys no computers)