

Instructions: Show your work in a step-by-step manner when **SYW** is indicated.

**SYW** 1. Simplify (write as a fraction)       $3^{-1} + 4^{-1}$

---

**SYW** 2. Simplify       $(2b^3c^8)^3$

---

**SYW** 3. Simplify       $-\left(\frac{4x^{-3}y}{25x^5y^{-9}}\right)^0$

---

**SYW** 4. Simplify       $\frac{b^{1/2}}{b^{1/3}}$

---

**SYW** 5. Simplify       $\frac{25b^{-6}c^{-8}}{35b^{-10}c^{-4}}$

---

SYW

6. Simplify  $\frac{(25b^8c^{-6})^{3/2}}{(7b^{-3})(2c^3)^{-1}}$

---

 answer

7. For  $f(x) = 4^x$ , find

a.  $f(-3/2)$

---

 answer

SYW

b.  $f^{-1}(25)$  (round to 3 decimal places)

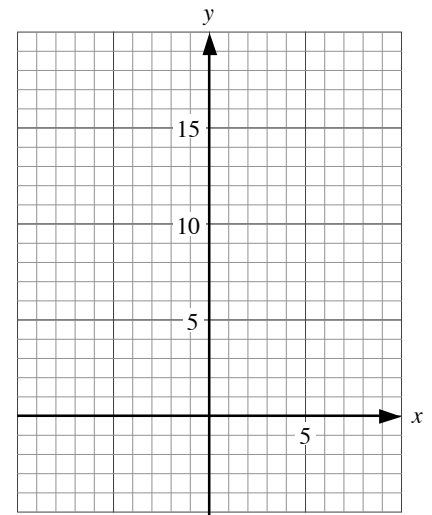
---

 answer

8. Let  $f(x) = 18\left(\frac{1}{3}\right)^x$ .

SYW

- a. Without using the table or graphing capabilities of your calculator, sketch the graph of  $f$ . Make a table of at least 5 input-output pairs *without* using decimal numbers.

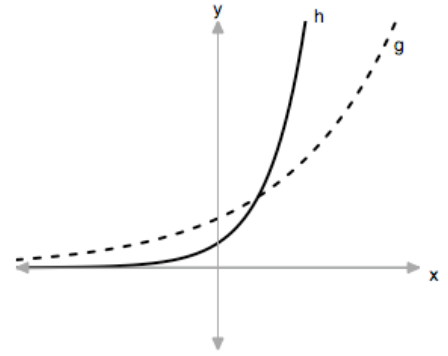


- b. State the domain and range of  $f$  in interval notation.

The domain of  $f$  is \_\_\_\_\_

The range of  $f$  is \_\_\_\_\_

8. The graph  $g(x) = 3(1.2)^x$  is shown as a dashed curve. Write a reasonable equation for  $h(x)$ .



$h(x) =$  \_\_\_\_\_

**SYW**

9. Without using the regression capabilities of your calculator find the equation of the exponential curve that passes through the points  $(4, 11)$  and  $(7, 50)$ . Round the constants to 3 decimal places.

\_\_\_\_\_   
 answer

**SYW**

10. Let  $f(x) = 2x - 3$ . Find  $f^{-1}(x)$ .

\_\_\_\_\_   
 answer

11. Let  $h(x) = 3^x$ . Find  $h^{-1}(x)$ .

\_\_\_\_\_   
 answer

12. Let  $h(x) = \ln(x)$ . Find  $h^{-1}(x)$ .

\_\_\_\_\_   
 answer



13. The number of Starbucks stores has substantially increased since the mid 1980s (see table). Let  $f(t)$  represent the number of Starbucks stores at  $t$  years since 1980.

Year	Number of Stores
1987	17
1991	116
1995	676
1999	2135
2001	4709

- a. Find the appropriate regression model (linear or exponential) for  $f(t)$ . Write the constants to 3 decimal places.

---

answer

- b. Predict the number of stores in 2008.

---

answer

- c. Find  $f^{-1}(9000)$ . Explain its meaning in this situation.

$f^{-1}(9000)$  is \_\_\_\_\_ which means \_\_\_\_\_

---

- d. Find the percentage growth rate of the stores (include units) and explain its meaning in this situation.

The percentage growth rate is \_\_\_\_\_ which means \_\_\_\_\_

---

14. Write  $c^t = a$  in logarithmic form.

---

answer

15. Write  $\log_y(w) = r$  in exponential form.

---

answer

**SYW**

16. Solve each of the following without using the graphing or table capabilities of your calculators. Round any approximate solution to 3 decimal places.

a.  $2(4)^{5x-1} = 19$

---

answer

b.  $\log_2(x-5) = 4$

---

answer

c.  $3b^6 - 16 = 7$

---

answer

d.  $8 + 2e^x = 15$

---

answer

e.  $3\ln(4x) + \ln(5x) = 7$

---

answer



17. Use the intersect function on a graphing calculator to solve  $4^x - 8 = -\frac{1}{2}x + 5$ .  
Round any solutions to 3 decimal places.

---

 answer

18. Let  $f(x) = 2x^3 - 4x + 8$  and  $g(x) = -3x^2 + 5x - 3$
- a. Find  $(f + g)(x)$

---

 answer

- b. Find  $(f + g)(2)$

---

 answer

- c.  $(f - g)(x)$

---

 answer

19. Find each product and simplify.
- a.  $3x^2(2x - 5)(4x + 1)$

---

 answer

- b.  $(4a + 5b)^2$

---

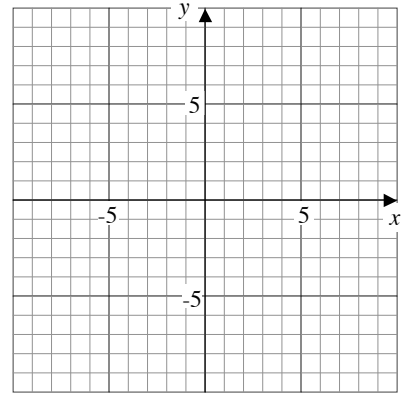
 answer

- c.  $(3r - 8t)(3r + 8t)$

---

 answer

20. **(Math 56 Only)** Graph the solution set.  
 $x - 2y > 6$   
 $x + 3y \leq 3$



**SYW**

21. **(Math 56 Only)** Without the use the graphing capabilities of your calculator, solve each of the following.
- a.  $|2x + 1| = 11$

---

answer

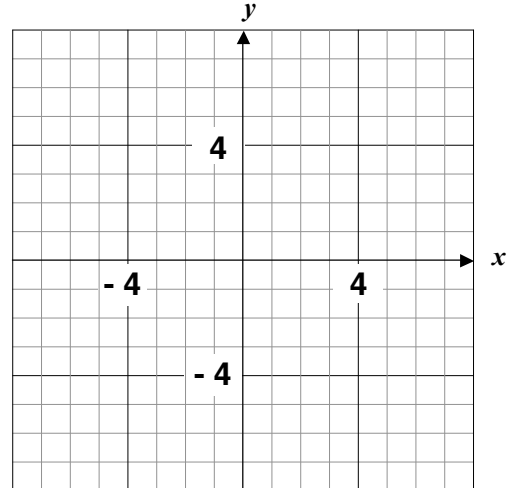
- b.  $|3t + 4| > 12$  (write in interval notation)

---

answer

The rest of this exam is optional. If you take it, then I will use the score on this exam for both Exam #1 and Exam #2.

22. Sketch the graphs of  $x = -6$  and  $y = 3$ .



23. Find the  $x$ - and  $y$ -intercepts of the equation  $4x - 3y = 12$ .

$x$ -intercept: \_\_\_\_\_

$y$ -intercept: \_\_\_\_\_

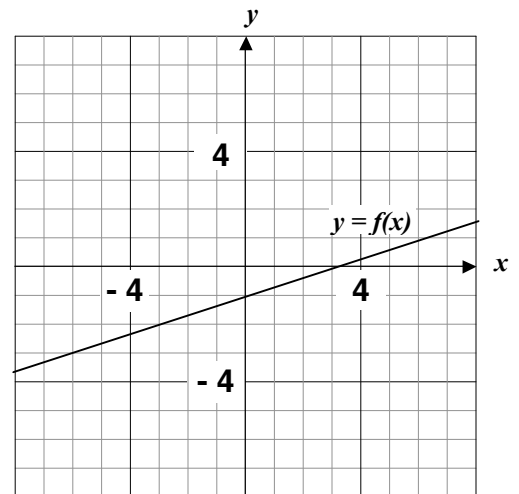
24. Use the graph of the function  $f$  to estimate the following. Find each of the following.

a.  $f(6)$

\_\_\_\_\_   
 answer

b.  $f^{-1}(-3)$

\_\_\_\_\_   
 answer



- SYW** 25. Without using the regression capabilities of your calculators, find the equation of the line passing through the points  $(-2, 6)$  and  $(3, -4)$ .

---

answer

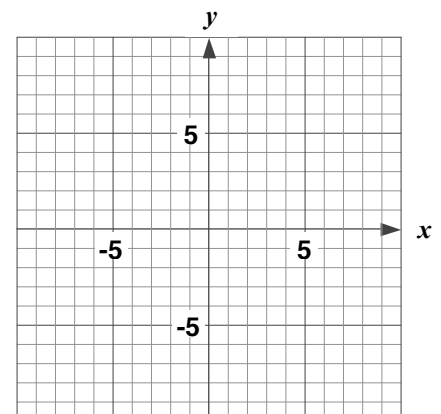
26. Some values for a linear equation are given in the table.  
Complete the table and find the equation between  $x$  and  $y$ .

$x$	$y$
1	-15
2	-11
3	
4	
5	
6	

---

answer

27. Solve by graphing  $\begin{cases} y = 3x - 7 \\ 4x + 2y = -4 \end{cases}$





28. Let  $p = f(t)$  represent the percentage of out-of-wedlock births in the United States for  $t$  years since 1900 (see table).

- a. Find the regression equation for  $f(t)$ .  
Write the constants to 2 decimal places.

$$f(t) = \underline{\hspace{2cm}}$$

- b. Find  $f(105)$  and explain its meaning in this application.

$$f(105) = \underline{\hspace{2cm}}, \text{ which means } \underline{\hspace{2cm}}$$

\_\_\_\_\_

- c. Find the value of  $t$  so that  $f(t) = 39$  and explain its meaning in this situation.

$$t = \underline{\hspace{2cm}}, \text{ which means } \underline{\hspace{2cm}}$$

\_\_\_\_\_

- d. What is the slope of the equation and what does it mean in this situation?

$$\text{The slope is } \underline{\hspace{2cm}}, \text{ which means } \underline{\hspace{2cm}}$$

\_\_\_\_\_

Year	Percent of Out-of-Wedlock Births
1970	10.7
1980	18.6
1990	28.5
2000	33.2

**SYW**

29. Solve by **substitution**.
- $$\begin{cases} 3y - x = -5 \\ 2x + 3y = 3 \end{cases}$$

\_\_\_\_\_

answer

**SYW** 30. Solve by **elimination**.

$$\begin{cases} 3x + 5y = 3 \\ 7x - 2y = -34 \end{cases}$$

---

answer

**SYW** 31. Solve by any method.

$$\begin{cases} y = 2x + 8 \\ 8x - 4y = -16 \end{cases}$$

---

answer

32. In 2002, the price of a 2001 Cadillac De Ville was \$30,500, and the price for a 2001 Acura Integra was \$16,300. The De Ville depreciates by \$4350 per year, and the Integra depreciates by \$870 per year. Let  $C(t)$  and  $A(t)$  represent the values of the Cadillac and Acura, respectively, for  $t$  years since 2001. When will the cars have the same value? What will the value be?

Both cars will have a value of \_\_\_\_\_ (nearest dollar) in the year \_\_\_\_\_.

**SYW** 33. Solve. Write the solution set in interval notation:  $5 - 2(x - 4) > 4x + 1$

---

answer

## Key

1.  $7/12$  2.  $8a^9b^{24}$  3.  $-1$  4.  $b^{1/6}$  5.  $\frac{5b^4}{7c^4}$  6.  $\frac{250b^{15}}{7c^6}$
7.  $1/8$ ;  $2.322$  8b. domain  $(-\infty, \infty)$ , range  $(0, \infty)$  8.  $g(x) = 2(1.7)^x$
9.  $y = 1.458(1.657)^x$  10.  $f^{-1}(x) = 0.5x + 1.5$  11.  $h^{-1}(x) = \log_3(x)$
12.  $h^{-1}(x) = e^x$  13.  $f(t) = 1.322(1.484)^t$ ;  $f(28) = 83,441$  stores;  
 $f^{-1}(9000) = 22.3$  means in 2002 there were 9000 stores; The  
 growth rate is 48.4%, which means the number of stores increases  
 by 48.4% each year.
14.  $\log_c(a) = t$  15.  $w = y^r$  16.  $0.525$ ;  $21$ ;  $\pm 1.404$ ;  $1.253$ ;  $1.361$
17.  $1.799$  18.  $(f + g)(x) = 2x^3 - 3x^2 + x + 5$ ;  $(f + g)(2) = 11$ ;  
 $(f - g)(x) = 2x^3 + 3x^2 - 9x + 11$  19.  $24x^4 - 54x^3 - 15x^2$ ;  
 $16a^2 + 40ab + 25b^2$ ;  $9r^2 - 64t^2$  21.  $5$  and  $-6$  22.  
 $(-\infty, \frac{16}{3}) \cup (\frac{8}{3}, \infty)$
22.  $x = -6$  is a vertical line and  $y = 3$  is horizontal 23.  $(3, 0)$   
 and  $(0, -4)$
24.  $1$ ;  $-6$  25.  $y = -2x + 2$  26.  $y = 4x - 19$  27.  $(1, -4)$
28.  $f(t) = 0.77t - 43.04$ ;  $f(105) = 37.8$  means in 2005 37.8% of  
 births were out-of-wedlock; in 2006 39% of births were out-of-  
 wedlock;  $m = 0.77$  means out of wedlock births increase by 0.77%  
 each year. 29.  $(\frac{24}{9}, -\frac{7}{9})$
30.  $(-4, 3)$  31. no solution / inconsistent system 32. Both cars  
 have a value of \$12,750 in 2006. 33.  $(-\infty, 2)$

The homework problems graded for the 5 extra credit points:  
 4.1 #49, 4.4 #45, 5.3 #51, 5.6 #45, and 6.2 #63.