

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

SYW 1. Simplify (write as a fraction) $2^{-1} + 3^{-1}$

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

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 $\frac{25b^{-9}c^{-8}}{35b^{-10}c^{-3}}$

SYW

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

 answer

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

a. $f(-3/2)$

 answer
SYW

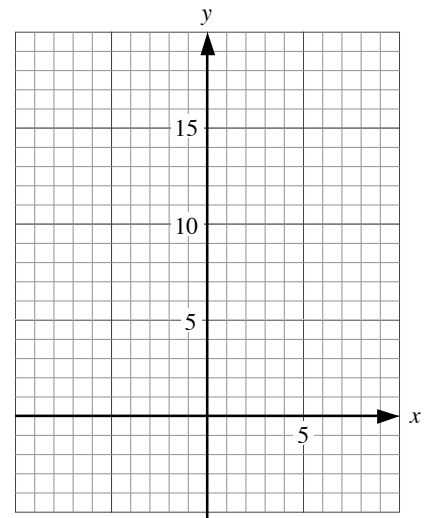
b. $f^{-1}(23)$ (round to 3 decimal places)

 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.



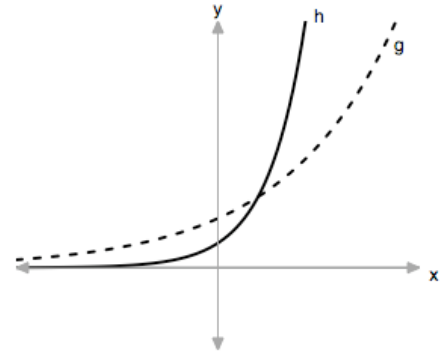
- b. State the domain and range of f in interval notation.

The domain of f is _____

The range of f is _____

8. The graph $h(x) = 2(1.7)^x$ is shown as a solid curve. Write a reasonable equation for $g(x)$.

$g(x) =$ _____



SYW

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

 answer

SYW

10. Let $f(x) = 2x - 4$. Find $f^{-1}(x)$.

 answer

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

 answer

12. Let $h(x) = \log(x)$. 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 2006.

answer

- c. Find $f^{-1}(8000)$. Explain its meaning in this situation.

$f^{-1}(8000)$ 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 $d^t = k$ in logarithmic form.

answer

15. Write $\log_r(w) = y$ 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. $2(4)^{5x-1} = 17$

answer

b. $\log_3(x-5) = 4$

answer

c. $3b^6 - 18 = 7$

answer

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

answer

e. $3\ln(4x) + \ln(5x) = 9$

answer



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

Round any solutions to 3 decimal places.

answer

18. Let $f(x) = 2x^3 - 4x + 8$ and $g(x) = -3x^2 + 15x - 3$

- a. Find $(f + g)(x)$

answer

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

answer

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

answer

19. Find each product and simplify.

- a. $3x^2(2x - 3)(4x + 1)$

answer

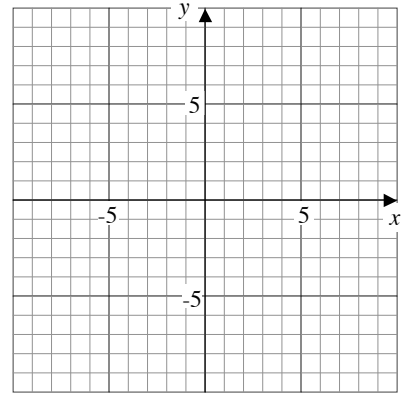
- b. $(4a + 3b)^2$

answer

- c. $(2r - 8t)(2r + 8t)$

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. $|2x + 1| = 11$

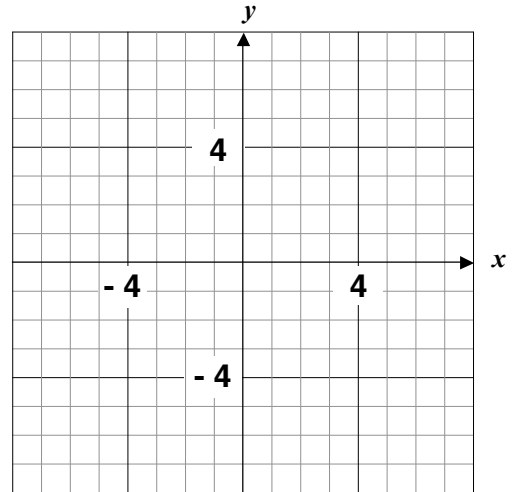
answer

- 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: _____

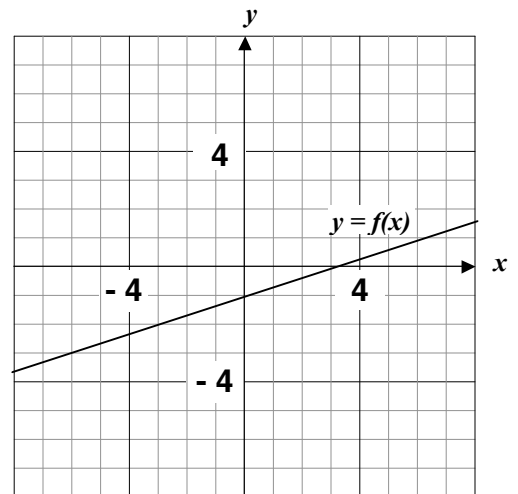
24. Use the graph of the function f to estimate the following. Find each of the following.

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 $(3, -4)$.

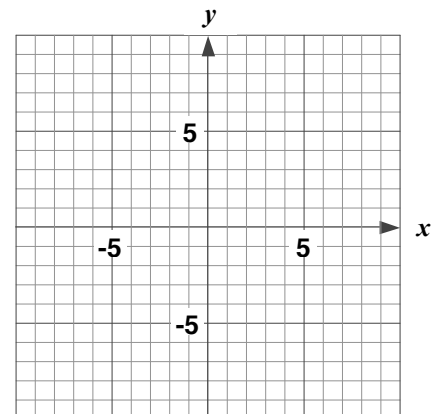
answer

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).

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

- 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?

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

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. $\frac{5}{6}$ 2. $9b^6c^{16}$ 3. -1 4. $b^{1/6}$ 5. $\frac{5b}{7c^5}$ 6. $\frac{250b^{14}}{7c^6}$ 7a. $1/8$
- 7b. 2.262 8b. domain $(-\infty, \infty)$, range $(0, \infty)$ 8. $g(x) = 3(1.2)^x$
9. $y = 0.915(1.771)^x$ 10. $f^{-1}(x) = 0.5x + 2$ 11. $h^{-1}(x) = \ln(x)$
12. $h^{-1}(x) = 10^x$ 13. $f(t) = 1.322(1.484)^t$; $f(26) = 37,889$ stores;
 $f^{-1}(8000) = 22$ means in 2002 there were 8000 stores; The growth rate is
 48.4%, which means the number of stores increases by 48.4% each year.
14. $\log_d(k) = t$ 15. $w = r^y$ 16. 0.509; 86; ± 1.424 ; 1.253; 2.243
17. 1.673 18. $(f + g)(x) = 2x^3 - 3x^2 + 11x + 5$; $(f + g)(2) = 31$;
 $(f - g)(x) = 2x^3 + 3x^2 - 19x + 11$ 19. $24x^4 - 30x^3 - 9x^2$;
 $16a^2 + 24ab + 9b^2$; $4r^2 - 64t^2$ 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.