Key

Precalculus/ College Algebra REVIEW Calculator Active

1. Find all real values of x such that $f(x) = 0$.

$f(x) = \dfrac{-4x+3}{9}$

$0 = \dfrac{-4x+3}{9}$

$4x = 3$

$x = 3/4$

2. Solve the system of equations using any method.

$$\begin{cases} 2x - 3y = -15 \\ 4x + 5y = 47 \end{cases}$$

$-2(2x - 3y = -15) \rightarrow -4x + 6y = 30$

$4x + 5y = 47$

$11y = 77$

$y = 7$

$4x + 35 = 47$

$4x = 12$

$x = 3$

$(3, 7)$

A) which method seems most efficient
B) check your solution in both equations

3. Find the equilibrium point of the demand and supply equations. (The equilibrium point is the price p and number of units x that satisfy both the demand and supply equations.)

Demand	**Supply**
$p = 49 - 0.03x$	$p = 0.7x - 535$

$49 - .03x = .07x - 535$

$584 = .73x$

$x = 800$

4. Evaluate the indicated function for $f(x) = x^2 - 6$ and $g(x) = x + 9$.

$(fg)(3)$

$(x^2 - 6)(x + 9)$

$(3)(12) = 36$

5. Determine the interval on which $(fg)(x)$ from problem 4 is decreasing.

A) what is the difference between increasing, decreasing and constant
B) do you use x values or y values

$x^3 + 9x^2 - 6x - 54$

$(-6.317, .317)$

E 6. Determine which point lies on the graph of the equation $y = 4x^2 - x + 4$.

A) ~~(2, 5)~~
B) (1, 5)
C) ~~(2, 7)~~
D) (3, 6)
E) (1, 7)

7. Find all the rational zeros of the function $f(x) = 3x^4 + 8x^3 - 71x^2 - 200x - 100$.

-2	3	8	-71	-200	-100
	↓	-6	-4	150	100
	3	2	-75	-50	0
5	↓	15	85	50	
	3	17	10	0	
-5	↓	-15	-10		
	3	2	0		

$2x + 2 = 0$

$x = -2/3$

8. Find $(f + g)(x)$.

$f(x) = 6x^2 - 2x - 1$

$g(x) = 5x^2 - 6x$

$11x^2 - 8x - 1$

E 9. Find a polynomial with real coefficients that has zeros -8, $10i$, and $-10i$.

A) $x^3 - 8x^2 + 100x - 800$
B) $x^3 + 100x^2 + 8x + 800$
C) $x^3 + 8x^2 - 100x - 800$
D) $x^3 + 8x^2 + 10x + 80$
E) $x^3 + 8x^2 + 100x + 800$

$(x+8)(x^2+100)$
$x^3 + 8x^2 + 100x + 800$

10. Condense the expression $\frac{1}{5}(\log x - \log y)$ to the logarithm of a single term. $\log \sqrt[5]{\frac{x}{y}}$

11. Find the value(s) of x for which $f(x) = g(x)$.

$f(x) = x^2 + 12x - 31$ $\quad$ $g(x) = 6x - 4$

$x^2 + 12x - 31 = 6x - 4$
$x^2 + 6x - 27 = 0$
$(x+9)(x-3)$
$x = -9, 3$

12. An initial investment of \$7000 grows at an annual interest rate of 8% compounded continuously. How long will it take to double the investment?

$14000 = 7000e^{.08t}$
$2 = e^{.08t}$
$\frac{\ln 2}{.08} = \frac{.08t}{.08}$
8.66 years

13. Find the inverse of the one-to-one function.

$y = 9x + 2$ $\quad$ $x = 9y + 2$
$\frac{x-2}{9} = y$

A) what are the steps to find an inverse function
B) what do inverse functions look like graphically

Reflect $y = x$

14. Solve the equation.

$7^x = 3$

$\log_7 7^x = \log_7 3$
$x = \log_7 3 \approx .565$

A) solve it algebraically
B) solve it graphically

15. \$3000 is invested at 4.2%, compounded monthly. How much will the investment be in 5 years?

A) Need to know this formula for the final

$A = P(1 + \frac{r}{n})^{nt}$
$3000(1 + \frac{.042}{12})^{12*5}$
\$3699.68

16. Give the coordinates of the circle's center and its radius.

$(x+1)^2 + (y-2)^2 = 9$

↳ $(-1, 2)$ $\quad$ $r = 3$

A) what is standard form of the equation of a circle
B) sketch the graph

17. The table below lists some points of a function.

x	1	3	4	6	7	8
$f(x)$	1.5	10.2	13.4	16.3	18.2	18.3

$Y = 2.28 * 1.36^x$ $r^2 = .72$

a. Find an exponential model for the data.
b. Find a logarithmic model for the data. (do you use LnReg or Logistic and why?)
c. Determine which model best fits the data. $Y = 1.46 + 8.33 \ln x$ $r^2 = .99$

ln

18. Determine whether the function is one-to-one.

$y = |x - 4|$

← NO does NOT pass Horizontal Line test

A) No, it isn't one-to-one.
B) Yes, it is one-to-one.

19. During one performance of the BC Players presentation of *The Producers*, the box office sold 243 tickets and collected $1335. If adult tickets sold for $9 and student's tickets sold for $3, how many of each type of ticket were sold?

$-3(S + A) = (243) \rightarrow -3S - 3A = -729$

$3S + 9A = 1335$ $3S + 9A = 1335$

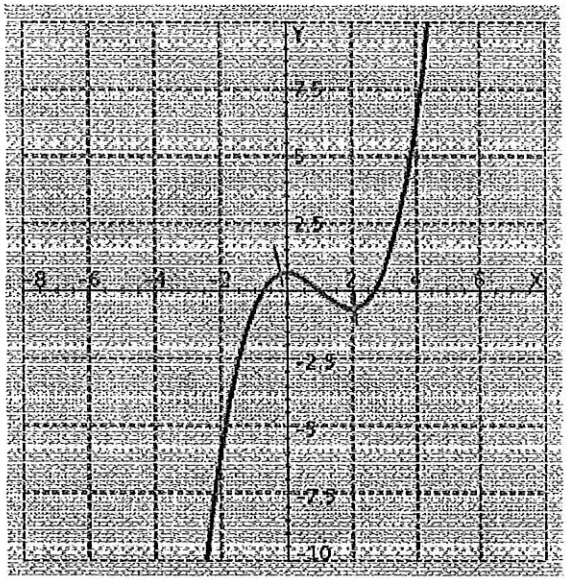
$6A = 606$

$A = 101$

$S = 142$

20. The graph of a function is sketched below.
Determine the interval on which the function is decreasing.

A) what is the difference between increasing, decreasing and constant
B) do you use x values or y values



Increasing
$(-\infty, 0)(2, \infty)$

Decreasing
$(0, 2)$

21. The number of bacteria present in a culture is $B = 75e^{0.17t}$ where t is the time in minutes. Find the time required, to the nearest half minute, to have 390 bacteria present.

$390 = 75e^{.17t}$

$5.2 = e^{.17t}$

$\ln 5.2 = .17t$

$t = 9.7 \rightarrow 10$ min

22. Solve the given system of equations.

$$\begin{cases} 8x-9y+z=-1 \\ 3x+3y-9z=-123 \\ 8x-5y+2z=-16 \end{cases}$$

$(-8, -6, 9)$

23. Find the vertex and focus of the parabola.

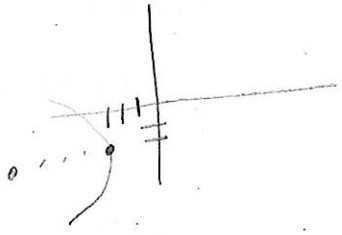
$(y+2)^2 = -16(x+3)$

$(y-k)^2 = 4p(x-h)$

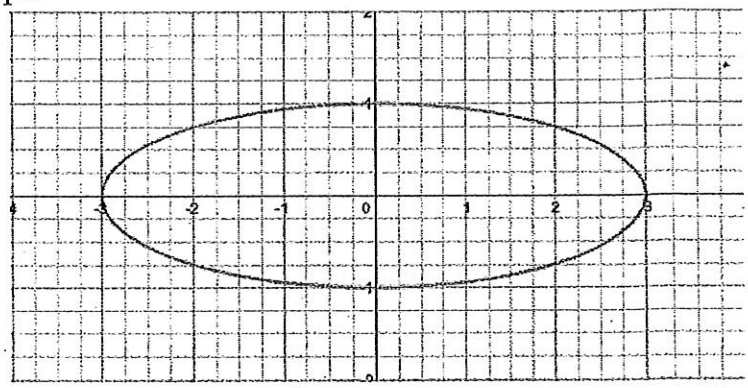
$-16 = 4p \quad p = -4$

vertex $(-3, -2)$

Focus $(-7, -2)$



24. Find the equation that represents the graph.



$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$\frac{x^2}{9} + \frac{y^2}{1} = 1$

25. Complete the square to find the center of the conic section. $9x^2 + y^2 - 108x - 2y + 289 = 0$

ellipse

$9x^2 - 108x + y^2 - 12y = -289$

$9(x^2 - 12x + \underline{36}) + (y^2 - 2y + \underline{1}) = -289 + \underline{324} + 1$

$9(x-6)^2 + (y-1)^2 = 36$

$(6, 1)$