Algebra 2 Boot Camp Calculator Tips and Tricks

A. Shortcuts with the ALPHA Button (Can also be found using the MATH button):

- You can enter fractions in the proper form by pressing ALPHA → y= → 1
- You can find the absolute value of a value by pressing ALPHA → WINDOW → 1
- You can do Sigma problems (Σ) by pressing ALPHA → WINDOW → 2
- You can evaluate logarithms by pressing ALPHA → WINDOW → 5

B. For adding, subtracting and multiplying imaginary (complex) numbers:

- Press MODE and cursor down and choose a+bi.
- Go back to the home screen 2nd MODE and do your calculations. To get the i, press 2nd → .

C. To enter data for regression lines and curves:

- Press STAT → EDIT
- Enter your x-values in L_1 and your y-values in L_2. To clear values, highlight L_1 or L_2 and press CLEAR (NOT Delete!) and ENTER. If you press delete, you will eliminate L_1 or L_2. If this happens, go to STAT → 5: SetUpEditor → ENTER and it will put L_1 and L_2 back in the program.
- Press y = , then arrow up to Plot 1 and press ENTER to turn on the Scatterplot.
- Press ZOOM 9: ZOOMSTAT to see the scatterplot of your entered data.
- Determine the type of function based on the shape of the graph, whether it be linear (4), quadratic (5), cubic (6), exponential (0), or logarithmic (B).
- Press STAT and arrow over to CALC and choose the appropriate type of regression. Press ENTER until you see the equation for your function.
- Go to the y= screen and type VARS→ 5: Statistics → Cursor over 2x to EQ→ENTER. Your regression equation will now appear in the y= place. Press GRAPH to see your function going through your scatterplot.
- You can now make predictions based on your graph. Press 2nd TRACE to find values of y when given an x value. Check your WINDOW to make sure the Xmax is larger than the x value you are entering.
- When you finish, turn off the Plot 1 by clicking ENTER. Then press ZOOM 6 (ZSTANDARD) to get back to a "normal" -10 by 10 graphing window.

D. To enter data for calculating Mean, Median, and Standard Deviation (*It is doubtful this will be on the test* ☺):

- Press STAT → EDIT and enter your values in L_1.
- Press STAT and arrow over to CALC. Choose 1-VAR STATS. Press ENTER until you see your information. Remember that $\overline{X}$ is your calculator's symbol for mean and σ is the standard deviation.

E. To store values for variables:

- Enter the value you want to store and press STO → X,T,θ,n → ENTER.
- If you have more than one variable, press ALPHA, then find the GREEN letter that you want to store the value to.
- Each time you need to use that variable, press ALPHA and the GREEN letter.
- *You do not need to clear the value you stored. If you want to use the variable for another value, just store the new value and it will replace the old value.*

F. To do SIGMA (Σ) problems on the calculator (will not do the sum of an infinite series):

- Press ALPHA WINDOW and choose 2. This can also be found using MATH → 0(summation)
- Use the X,T,θ,n button for your variable and after putting in all values, press ENTER.

G. To solve an absolute value inequality on the calculator

- Move your inequality over to one side and write it in terms of y .
- Type the inequality into the y= screen and go to the left of y_1. Change the \ to Y_1 for less than and ◥ for greater than. Press ZOOM 6 (ZStandard). Your solution will be graphed on the x-axis.

H. To find zeros of a function or the factors of a function using POLYMSLT2:

- Get one side of your equation equal to zero.
- Press the APPS button and choose 4: PlySmlt2.
- Press ENTER, then choose Option 1: POLYNOMIAL ROOT FINDER.
- Fill in the number for the ORDER = highest power/degree of the polynomial (ex: 2 for a quadratic eq.).
- Choose a+bi so it will give you both the real and imaginary solutions.
- Choose FRAC (So the answer will be displayed as a fraction if the solutions are rational).
- Keep it on NORMAL, FLOAT, and DEGREE.
- Press GRAPH (which is the NEXT option)
- Plug in the numbers: a_2 = the coefficient of x^2, a_1 = the coefficient of x and a_0 = the constant.
- Press GRAPH to get your solutions.
- If you are looking for a factor of a polynomial, then take the roots and make the factors from them.

    Example: If the roots are -2 and $\frac{2}{3}$, then your factors will be $(x + 2)$ and $(3x - 2)$.

- Press 2nd MODE two times to get out of the app and back to the home screen.

I. To solve ANY type of equation on your calculator:

- Set your equation equal to zero and type it in the y = screen. The solution/roots/zeros is where the graph crosses the x-axis! Press 2nd TRACE 2: zero to calculate the zeros of the function.
- **OR** put the left side of the equation into y_1 and the right side of the equation into y_2 to create a system of equations and follow the steps in I to solve your system. Only the x coordinates are your solutions.

J. To find the solution to a system of equations on your calculator:

- Solve each equation for y. Put one into y_1 and the other into y_2.
- Type ZOOM 6 (ZStandard) to get to the standard viewing window.
- Type 2nd TRACE (CALC) → 5: intersect. Press ENTER 3 times to find your point of intersection.
- If there is more than one solution, curser close to the point of intersection before pressing ENTER 3 times.

K. To see if two expressions are equivalent using the calculator: Method 1

- Graph the original expression in your calculator in y_1
- Graph one of the answer choices in y_2
- See if the two graphs line up EXACTLY
- *Note: There may be two "correct" answer choices. Always choose the most simplified answer.*

L. To see if two expressions are equivalent using the calculator: Method 2

- Store an unusual number for the variable (like -.2315)
- Type the original expression in your calculator, using the variable. Press ENTER to see what you get.
- Type one of the answer choices into the calculator, press ENTER and see if you get the same output.
- *Note: There may be two "correct" answer choices. Always choose the most simplified answer.*

M. To find the probability (without the table) in a Normal Distribution problem, use the LUMS method.

- Type 2nd →VARS → normalcdf (L, U, M, S) → ENTER
- Type in the number for lower (which is the lower boundary of the shaded area), upper (which is the upper boundary of the shaded area), mean (μ), and standard deviation (σ).
- Click PASTE and Enter. Your values will be on the home screen. Press ENTER again to get your answer.
- HINT: For the lower and upper boundaries, *use -1×10^{99} and 10^{99} as needed for very small ($-\infty$) and very large ($+\infty$) limits!*

On the following pages, you will be given problems to practice the above calculator operations. While it is best to solve problems algebraically first and use the calculator method to check your answers, please use the calculator method to solve the problems order to focus on the tips that you have learned today.

1. What are the y-coordinates for the solutions to this system of equations?

$$\begin{cases} x^2 + 6x + 3y + 6 = 0 \\ x + y + 20 = 0 \end{cases}$$

Handwritten:
$3y = -x^2 - 6x - 6$
$y = -\frac{1}{3}x^2 - 2x - 2$
$y = -x - 20$

A. y = -9 and y = 6

B. y = -20 and y = -2

C. y = -26 and y = -11

D. y = -27 and y = -18

Handwritten:
WINDOW
[-10,10,1,-40,19,1]
INT. (-9,-11)
(6,-26)

2. Simplify $\left(2\sqrt{3x^5} - 2\sqrt{y}\right)^2$

Handwritten: $\left(2\sqrt{3x^5} - 2\sqrt{y}\right)\left(2\sqrt{3x^5} - 2\sqrt{y}\right)$

A. $12x^5 - 8x^2\sqrt{3xy} + 4y$

B. $12x^5 - 16x^4\sqrt{3xy} + 4y^2$

C. $4x^4\sqrt{3x} - 4x^2\sqrt{6xy} + 4\sqrt{y}$

D. $12x^5 + 4y$

Handwritten:
$4 \cdot 3x^5 - 4\sqrt{3x^5y} + 4y$
$- 4\sqrt{3x^5y}$
$12x^5 - 8\sqrt{3x^5y} + 4y$
$12x^5 - 8x^2\sqrt{3xy} + 4y$

3. The amount of lost revenue from tickets not sold for a concert is shown in the table. The ticket prices include tax.

Lost Revenue From Tickets Not Sold

Price per Ticket (x)	$25	$35	$55	$125
Number of Tickets Not Sold	84	80	92	323
Amount of Lost Revenue (y)	$2,100	$2,800	$5,060	$40,325

Which equation best models the relationship between y₁, the amount of lost revenue, and x₁, the price per ticket?

A. $y = 1218(1.01)^x$

B. $y = 997(1.03)^x$

C. $y = 400x - 11570$

D. $y = 156x - 10000$

4. Evaluate $\displaystyle\sum_{n=5}^{40} 3n + 2$

Handwritten: 2502

5. Which expression is equivalent to the following expression if no denominator equals zero?

$$\dfrac{-13 + d}{\dfrac{42d^3}{13 - d}}{6d^9}$$

A. $-\dfrac{7}{d^3}$

B. $-\dfrac{d^3}{7}$

C. $\dfrac{7}{d^6}$

D. $-\dfrac{d^6}{7}$

Handwritten:
$\dfrac{-13+d}{42d^3} \cdot \dfrac{6d^9}{13-d}$
$\dfrac{-6d^9}{42d^3} = \dfrac{-d^6}{7}$

6. Which of the following describes the end behavior of $f(x) = 9\log\left(\dfrac{2}{5}x\right) + 5$ as x approaches 0?

A. f(x) approaches -∞

B. f(x) approaches 0

C. f(x) approaches 5

D. f(x) approaches ∞

7. Which of the following is the simplified form for $8\sqrt{28} - 4\sqrt{63}$?

A. $4\sqrt{35}$

B. $12\sqrt{91}$

C. $4\sqrt{7}$

D. $32\sqrt{35}$

Handwritten:
$8\sqrt{7 \cdot 4} - 4\sqrt{9 \cdot 7}$
$16\sqrt{7} - 12\sqrt{7}$
$4\sqrt{7}$

8. Simplify the algebraic expression completely.

$$\sqrt[3]{54x^4y^6} - \sqrt[3]{24x^3y^9} + \sqrt[3]{128x^4y^6}$$

A. $x^2y^3\sqrt{6} + 8x^2y^3\sqrt{2} - 4xy^4\sqrt{6xy}$

B. $7xy^2\sqrt[3]{2x} - 2xy^3\sqrt[3]{3}$

C. $7x^2y^4\sqrt[3]{2x} - 2xy^3\sqrt[3]{3}$

D. $\sqrt[3]{158x^5y^3}$

Handwritten:
$\sqrt[3]{27 \cdot 2 \cdot x^3 x \cdot y^6} - \sqrt[3]{8 \cdot 3 \cdot x^3 y^9} + \sqrt[3]{64 \cdot 2 x^3 x}$
$3xy^2\sqrt[3]{2x} - 2xy^3\sqrt[3]{3} + 4xy^2\sqrt[3]{2x}$
$7xy^2\sqrt[3]{2x} - 2xy^3\sqrt[3]{3}$

9. Which expression is equivalent to $2^{\frac{3}{2}}x^{\frac{3}{2}}y^{\frac{5}{2}}$?

A. $\sqrt[3]{2x^3y^5}$

B. $2xy^2\sqrt{2xy}$

C. $\sqrt[3]{4x^3y^5}$

D. $2x^2y^4\sqrt{2xy}$

(handwritten) $\sqrt{2^3x^3y^5}$ $\sqrt{2^2\cdot 2x^2\cdot x\, y^4\, y}$ $2xy^2\sqrt{2xy}$

10. Which of the following is a factor of $10x^2 + 14x - 12$?

A. $(5x + 3)$

B. $(x + 2)$

C. $(x - 2)$

D. $2x$

11. Click on a box to choose each expression you want to select. You must select the two correct expressions.

Identify each expression that is equivalent to $\sqrt[6]{729q^{17}r^{11}}$. Select the two answers that are correct.

| $\frac{729}{6}q^{\frac{17}{6}}r^{\frac{11}{6}}$ | $\frac{729}{6}q^{11}r^{5}$ | $3q^{\frac{17}{6}}r^{\frac{11}{6}}$ | $3q^{11}r^{5}$ |
| $\frac{729}{6}q^{\frac{6}{17}}r^{\frac{6}{11}}$ | $\frac{729}{6}q^{2}r\,\sqrt[6]{q^5r^5}$ | $3q^{\frac{6}{17}}r^{\frac{6}{11}}$ | $3q^2r\,\sqrt[6]{q^5r^5}$ |

12. Which of the following are equivalent to i^{63}?

| **I** | $-i$ | **II** | i | **III** | i^{12} |
| **IV** | i^{15} | **V** | i^{4} | | |

13. Perform the indicated operation and simplify $(7-6i)(3+2i)$

A. $33 - 4i$

B. $33 - 32i$

C. $9 - 4i$

D. $9 + 32i$

14. What is the solution set for $3|2x+7|+9=-15$?

A. $\{\ \}$

B. $\left\{-\dfrac{15}{2}\right\}$
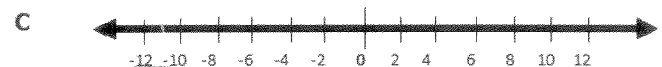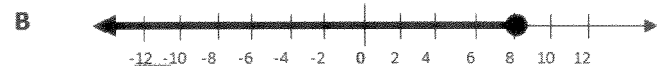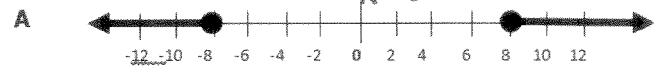
C. $\left\{\dfrac{1}{2}\right\}$

D. $\left\{-\dfrac{15}{2},\dfrac{1}{2}\right\}$

(handwritten) $3|2x+7|=-24$ $|2x+7|=-8$ $\varnothing$

15. Which of the following is the solution of $\left|\dfrac{3}{4}x-3\right|-8\geq -5$?

(handwritten) $\left|\frac{3}{4}x-3\right|\geq 3$ $\frac{3}{4}x\geq 6$ $x\geq 8$ $\left|\frac{3}{4}x-3\right|\leq -3$ $\frac{3}{4}x\leq 0$ $x\leq 0$

A

B

C

D

16. Which of the following are the roots for $3x^2 - 2x + 7 = x^2 + 2$?

A. $\dfrac{1}{2}\pm 3i$

B. $\dfrac{1\pm 3i}{2}$

C. $1\pm 8i$

D. $-\dfrac{3}{2},\dfrac{5}{2}$

(handwritten) $2x^2-2x+5=0$ $\dfrac{2\pm\sqrt{4-4(10)}}{4}$ $\dfrac{2\pm\sqrt{-36}}{4}$ $\dfrac{2\pm 6i}{4}=\dfrac{1\pm 3i}{2}$ or $\dfrac{1}{2}\pm\dfrac{3i}{2}$

17. Determine the nature of the solutions of $11x^2 + 9x = -2$.

A. two real solutions

B. two imaginary solutions

C. 1 real solution

D. 1 real and 1 imaginary solution

(handwritten) $11x^2+9x+2=0$ $81-4(22)$ -7 $=$ discrim.

18. Solve $5-2(3x^2-2x)=x^2+7-2x^2$

A. $\left\{\dfrac{-4\pm i\sqrt{6}}{5}\right\}$

B. $\left\{\dfrac{-4\pm\sqrt{6}}{5}\right\}$

C. $\left\{\dfrac{2\pm i\sqrt{6}}{5}\right\}$ (circled)

D. $\left\{\dfrac{2\pm\sqrt{6}}{5}\right\}$

Handwritten:
$5-6x^2+4x=-x^2+7$
$0=5x^2-4x+2$
$\dfrac{4\pm\sqrt{16-4(10)}}{10}$
$\dfrac{4\pm\sqrt{-24}}{10}$
$\dfrac{4\pm2i\sqrt{6}}{10}=\dfrac{2\pm i\sqrt{6}}{5}$

19. Solve $\dfrac{1}{x}+\dfrac{2x-1}{6x}=2$

A. $\{-2\}$

B. $\left\{-\dfrac{3}{2}\right\}$

C. $\left\{\dfrac{5}{14}\right\}$

D. $\left\{\dfrac{1}{2}\right\}$ (circled)

Handwritten:
$\dfrac{6}{6x}+\dfrac{2x-1}{6x}=2$
$\dfrac{2x+5}{6x}=2$
$2x+5=12x$
$5=10x$
$\dfrac{1}{2}=x$

20. Identify the x-coordinate of each point that is in the solution set of the system of equations.

$y=x^2+7x-6$
$y=5(x-2)^2-8$

Handwritten: WINDOW $[-10,10,1,-10,100,1]$ $(.75,-1.875)$ $(6,72)$

$\dfrac{-3}{16}$	$\dfrac{3}{4}$ (circled)	$\dfrac{13}{8}$	$\dfrac{27}{8}$	6 (circled)	72

21. Identify each function with the same range as $f(x)=|x|-4$

Handwritten: $y\geq -4$

$g(x)=x^2+2x-3$ (circled) *Handwritten:* Calculate the min.
$h(x)=x^3-4$
$j(x)=2^x-5$
$k(x)=\sqrt{x}-4$
$m(x)=(x-4)^2$

22. The braking distance of an automobile varies directly as the square of the speed. If the braking distance of a certain car is 49 feet at 30 miles per hour, find the approximate braking distance at 65 miles per hour.

Handwritten:
$d=ks^2$
$49=k(30)^2$
$\dfrac{49}{900}=k$
$d=\dfrac{49}{900}s^2$
$d=\dfrac{49}{900}\cdot65^2=230.02$ feet (circled)

23. Which of the following functions have a domain of $\{x\,|\,x>7\}$? Circle all that apply.

$y=\sqrt[3]{x-7}+1$ ℝ
$y=\sqrt{x-2}+7$ $x\geq 2$
$y=5^{x-7}+3$ ℝ
$y=2-\log(x-7)$ (circled)
$y=\sqrt{x-7}+1$ $x\geq 7$
$y=\dfrac{x+2}{x-7}$ ℝ, $x\neq$

24. Throughout which interval is the function $f(x)=2x^3-3x^2-12x$ increasing?

A. $-2<x<\infty$

B. $-\infty<x<-1$ (circled)

C. $-1<x<2$

D. $-20<x<\infty$

Handwritten: $-\infty<x<-1$ $2<x<\infty$

25. The graphs of $y=\dfrac{3}{x-2}$, $y=\dfrac{x+2}{x-2}$, $y=\dfrac{3x^2-4}{3x^2-12}$ all share an asymptote of:

A. $x=2$ (circled)

B. $x=1$

C. $y=2$

D. $y=1$

Handwritten: $\dfrac{3(x^2-4)}{3(x+2)(x-2)}$

**26.** How many non-real solutions exist for the polynomial function? $f(x)=x^5+x^3-2x^2-12x-8$

A. 3

B. 2 (circled)

C. 1

D. 0

Handwritten: degree 5 w/ 3 real = 2 imaginary sol.

27. How many different four-digit numbers can be made using the digits 1, 2, 3, 4, 5, 6, if no digit can be used more than once?

A. 360 (circled)

B. 90

C. 30

D. 15

Handwritten: $_6P_4$

28. The table shows the number of new stores in a coffee shop chain that opened during the years 1986 through 1994. Using $x = 1$ to represent the year 1986 and y to represent the number of new stores, determine the equation for the curve of best fit that most closely models the data. Round all values to the nearest hundredths.

Year	Number of New Stores
1986	14
1987	27
1988	48
1989	80
1990	110
1991	153
1992	261
1993	403
1994	681

Exponential
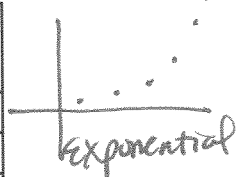
A. $y = 71.58x - 160.47$

B. $y = 10.60(1.59)^x$ *(circled)*

C. $y = 14.98x^2 - 78.17x + 114.07$

D. $y = -128.40 + (229.08)\ln x$

29. The amount of time required to stack boxes varies directly with the number of boxes and inversely with the number of people who are stacking them. If 2 people can stack 60 boxes in 10 minutes, how many minutes will be required for 6 people to stack 120 boxes?

$t = \dfrac{kb}{p}$ $10 = \dfrac{k(60)}{2}$ → $t = \dfrac{\frac{1}{3}b}{p}$

$20 = 60k$
$\dfrac{1}{3} = k$ $t = \dfrac{\frac{1}{3}(120)}{6}$

(circled) 6.7 meters

30. A normally distributed set of 968 values has a mean of 108 and a standard deviation of 11. Which is closest to the number of values expected to be above 125?

A. 910

B. 789

C. 210

D. 59 *(circled)*

$\mu = 108$, $\sigma = 11$

.0611

$968(.0611) = 59.16$
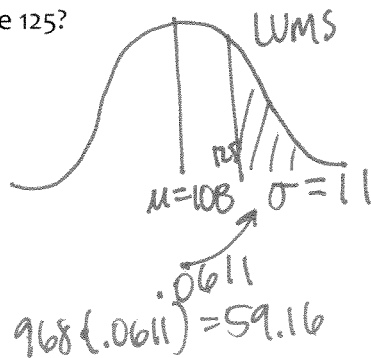
31. The mean amount of time that a manager spends in annual performance review with an employee is 27.2 minutes, with a standard deviation of 4.9 minutes. Approximately what percentage of annual performance reviews in the department take between 17.4 and 37 minutes?

A. 20%

B. 50%

C. 68%

D. 95% *(circled)*

$\sigma = 4.9$

17.4 27.2 37

2 SD above & below the mean

Emp. Rule w/ LUMS: 95.49%
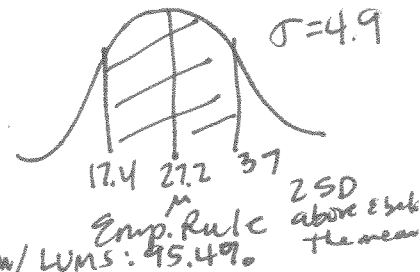
32. A 10 person student council will be selected from 18 students at a school. How many possibilities are there for this student council?

$_{18}C_{10} = 43,758$ *(circled)*

33. Twelve dogs are competing in a dog show. In how many ways could they place first, second and third?

A. 6

B. 220

C. 1320 *(circled)*

D. 79,833,600

$_{12}P_3$

1320

34. The heights of 200 kindergarten students at T.E. Wright Elementary are normally distributed with a mean of 40 inches and a standard deviation of 1.8 inches. Approximately how many students have a height between 37.3 inches and 44.5 inches?

$\sigma = 1.8$

185 | **Students**   37.3 40 44.5

.926 · (200) = 185.
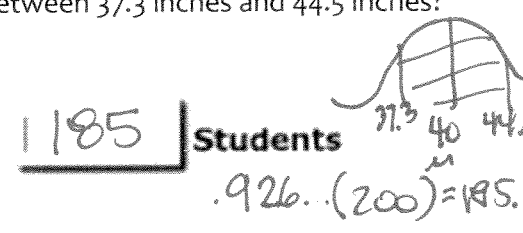
35. The running times for a group of 200 runners to complete a one mile run are normally distributed with a mean of 6.5 minutes and a standard deviation of 1.5 minutes. Approximately how many of the runners have a time greater than 8 minutes?

$\sigma = 1.5$

16% of 200

32 *(circled)*

6.5 8