

SUMMER WORKSHEET**DUE: First day of school.**

This assignment is to be done at your leisure during the summer (it should take approximately 4 hours – so don't procrastinate!). It is designed to help you become comfortable and stay proficient with your graphing calculator. You may need to read the manual to understand how your calculator works. It is important that you gain/practice these skills over the summer so that we can spend our time talking about calculus rather than how to use the calculator. It will be graded for accuracy and is worth 30 points.

Note: If you have questions, please email me (tshull@mlsd.org) over the summer, as I will periodically check emails from home.

Also, #1-31 are to be done with the use of a graphing calculator, whereas #32-34 you will need to show work done by hand.

For #1-10, (on a separate sheet of paper) graph the **parent function** of each set using your calculator. Draw a quick sketch on your paper of each additional equation in the family. Check your sketch with the graphing calculator.

1.) Parent Function: $y = x^2$

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|-------------------------|---------------------------|------------------------------------|---------------------------|
| a.) $y = x^2 - 5$ | b.) $y = x^2 + 3$ | c.) $y = (x - 10)^2$ | d.) $y = (x + 8)^2$ |
| e.) $y = 4x^2$ | f.) $y = 0.25x^2$ | g.) $y = -x^2$ | h.) $y = -(x + 3)^2 + 6$ |
| i.) $y = (x + 4)^2 - 8$ | j.) $y = -2(x + 1)^2 + 4$ | k.) $y = \frac{1}{3}(x - 6)^2 - 6$ | l.) $y = -3(x + 2)^2 - 2$ |

2.) Parent Function: $y = \sin(x)$ (all trig functions should be done in RADIAN mode)

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|--------------------|-----------------------|---------------------|--------------------------|
| a.) $y = \sin(2x)$ | b.) $y = \sin(x) - 2$ | c.) $y = 2 \sin(x)$ | d.) $y = 2 \sin(2x) + 2$ |
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3.) Parent Function: $y = \cos(x)$

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|--------------------|---------------------|-------------------------|--------------------------|
| a.) $y = \cos(3x)$ | b.) $y = \cos(x/2)$ | c.) $y = 2 \cos(x) + 2$ | d.) $y = -2 \cos(x) - 1$ |
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4.) Parent Function: $y = x^3$

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|---------------------|-------------------------|---------------------------|--------------------|
| a.) $y = x^3 + 2$ | b.) $y = -x^3$ | c.) $y = x^3 - 5$ | d.) $y = -x^3 + 3$ |
| e.) $y = (x - 4)^3$ | f.) $y = (x - 1)^3 - 4$ | g.) $y = -2(x + 2)^3 + 1$ | h.) $y = x^3 + x$ |

5.) Parent Function: $y = \sqrt{x}$

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|------------------------|-------------------------|------------------------|-------------------------|
| a.) $y = \sqrt{x} - 2$ | b.) $y = \sqrt{-x}$ | c.) $y = \sqrt{x} + 5$ | d.) $y = \sqrt{6 - x}$ |
| e.) $y = -\sqrt{x}$ | f.) $y = -\sqrt{-x}$ | g.) $y = \sqrt{x + 2}$ | h.) $y = \sqrt{2x - 6}$ |
| i.) $y = -2\sqrt{x}$ | j.) $y = -\sqrt{4 - x}$ | | |

6.) Parent Function: $y = \ln(x)$

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|----------------------|----------------------|-----------------------|------------------------|
| a.) $y = \ln(x + 3)$ | b.) $y = \ln(x) + 3$ | c.) $y = \ln(x - 2)$ | d.) $y = \ln(-x)$ |
| e.) $y = -\ln(x)$ | f.) $y = \ln(x)$ | g.) $y = \ln(2x) - 4$ | h.) $y = -3\ln(x) + 1$ |

7.) Parent Function: $y = e^x$

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|------------------|-------------------|-------------------|----------------------|
| a.) $y = e^{2x}$ | b.) $y = e^{x-2}$ | c.) $y = e^{2-x}$ | d.) $y = e^{2x} + 3$ |
| e.) $y = -e^x$ | f.) $y = e^{-x}$ | g.) $y = 2 - e^x$ | h.) $y = e^{0.5x}$ |

8.) Parent Function: $y = a^x$

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|---------------------------|-------------------|-----------------------|
| a.) $y = 5^x$ | b.) $y = 2^x$ | c.) $y = 3^{-x}$ |
| d.) $y = (\frac{1}{2})^x$ | e.) $y = 4^{x-3}$ | f.) $y = 2^{x-3} + 2$ |

9.) Parent Function: $y = 1/x$

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|---------------------|----------------|---------------------|---------------------|
| a.) $y = 1/(x - 2)$ | b.) $y = -1/x$ | c.) $y = 1/(x + 4)$ | d.) $y = 2/(5 - x)$ |
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10.) Parent Function: $y = [x]$

Note: $[x]$ is the "Integer Part" of x (aka: Greatest Integer). It is ("int()") found in the MATH menu, NUM submenu.

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|-------------------|-------------------|--------------------|
| a.) $y = [x] + 2$ | b.) $y = [x - 3]$ | c.) $y = [3x]$ |
| d.) $y = [0.25x]$ | e.) $y = 3 - [x]$ | f.) $y = 2[x] - 1$ |

11.) Resize your viewing window to $[0, 1] \times [0, 1]$. Graph all of the following functions in the same window.

List the functions from the highest graph to the lowest graph. How do they compare for values of $x > 1$?

a.) $y = x^2$
d.) $y = x^{2/3}$

b.) $y = x^3$
e.) $y = |x|$

c.) $y = \sqrt{x}$
f.) $y = x^4$

12.) Find all roots/zeros/solutions/x-intercepts to the nearest 0.001, given: $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$

13.) In the interval $[-2\pi, 2\pi]$, find all roots to the nearest 0.001, given: $f(x) = 3 \sin 2x - 4x + 1$

14.) Find all roots to the nearest 0.001, given: $f(x) = 0.7x^2 + 3.2x + 1.5$

15.) Find all roots to the nearest 0.001, given: $f(x) = x^4 - 8x^2 + 5$

16.) Find all roots to the nearest 0.001, given: $f(x) = x^3 + 3x^2 - 10x - 1$

17.) Find all roots to the nearest 0.001, given: $f(x) = 100x^3 - 203x^2 + 103x - 1$

18.) Find all roots to the nearest 0.001, given: $f(x) = |x - 3| + |x| - 6$

19.) Find all roots to the nearest 0.001, given: $f(x) = |x| - |x - 6|$

For #20-22, solve the inequalities. Check your answers by graphing on your calculator (sketch the graph).

20.) $x^2 - x - 6 > 0$

21.) $x^2 - 2x - 5 \geq 3$

22.) $x^3 - 4x < 0$

For #23-26, sketch the graph of each of the following:

a.) $f(x)$

b.) $|f(x)|$

c.) $f(|x|)$

d.) $f(2x)$

e.) $2f(x)$

23.) $f(x) = 2x + 3$

24.) $f(x) = x^2 - 5x - 3$

25.) $f(x) = 2 \sin(3x)$

26.) $f(x) = -x^3 - 2x^2 + 3x - 4$

27.) If $f(x) = \sin x$ and $g(x) = \cos x$, sketch the graph of each of the following:

a.) f^2

b.) g^2

c.) $f^2 + g^2$

28.) Find the coordinates of any point(s) of intersection for $f(x) = 3x + 2$ and $g(x) = -4x - 2$.

29.) Find the coordinates of any point(s) of intersection for $f(x) = x^2 - 5x + 2$ and $g(x) = 3 - 2x$.

30.) How many times does the graph of $y = 0.1x$ intersect the graph of $y = \sin(2x)$?

31.) Find any point(s) considered to be either a maximum or minimum for $f(x) = x^4 - 7x^3 + 6x^2 + 8x + 9$.

For #32-34, show the work that leads to the answer.

32.) if $\mathbf{h(x) = 2x^2 + x}$, find the following:

a.) $h(3)$

b.) $h(-2)$

c.) $h(\frac{1}{2})$

33.) if $\mathbf{g(x) = 4x^3 - x}$, find the following:

a.) $g(a)$

b.) $g(a + 1)$

c.) $g(a - 2)$

34.) find $\mathbf{f(x + h)}$ for each of the following functions:

a.) $f(x) = 3x + 1$

b.) $f(x) = 4x^2$

c.) $f(x) = x^2 - 2x$