

Summer Assignment for Calculus Students

1) Do all problems.

2) Work for each problem must be shown.

3) If the answer for a problem is a graph draw the graph on graph paper.

4) Use a straight edge to draw a straight line.

5) Do some research on the study of Calculus. Write a report on your findings. The report must be one page typed double spaced. Some of the things your report should contain are:

a) What is calculus?

b) What are the two major topics into which calculus is divided?

c) Identify individuals who help develop calculus and what were their contributions.

6) All work must be presented in a folder or binder.

AP CALCULUS SUMMER WORKSHEET

DUE: First day of school.

This assignment is to be done at your leisure during the summer. It is designed to help you become comfortable with your graphing calculator. You will need to read the manual to understand how your calculator works. It is important that you gain these skills over the summer so that we can spend our time talking about calculus rather than how to use the calculator.

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. Be sure to label the scale of each graph.

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

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: $y = \sin(x)$ (set mode to RADIANS)

a) $y = \sin(2x)$

b) $y = \sin(x) - 2$

c) $y = 2 \sin(x)$

d) $y = 2\sin(2x) + 2$

3) Parent Function: $y = \cos(x)$

a) $y = \cos(3x)$

b) $y = \cos(x/2)$

c) $y = 2\cos(x) + 2$

d) $y = -2\cos(x) - 1$

4) Parent Function: $y = x^3$

a) $y = x^3 + 2$

b) $y = -x^3$

b) $y = x^3 - 5$

c) $y = -x^3 + 3$

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: $y = \sqrt{x}$

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: $y = \ln(x)$

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: $y = e^x$

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 $y = a^x$

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: $y = 1/x$

a) $y = 1/(x-2)$

b) $y = -1/x$

c) $y = 1/(x+4)$

d) $y = 2/(5-x)$

10) Parent Function: $y = [x]$

Note: $[x]$ is the IntegerPart of x . It is found in the MATH menu, NUM submenu.

a) $y = [x] + 2$

b) $y = [x-3]$

c) $y = [3x]$

d) $y = [0.25x]$

e) $y = 3 - [x]$

e) $y = 2[x] - 1$

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) $y = x^2$

b) $y = x^3$

c) $y = \sqrt{x}$

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

e) $y = |x|$

f) $y = x^4$

12) Given: $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$
Find all roots to the nearest 0.001

13) Given: $f(x) = 3 \sin 2x - 4x + 1$ from $[-2\pi, 2\pi]$
Find all roots to the nearest 0.001.
Note: All trig functions are done in radian mode.

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

- 15) Given: $f(x) = x^4 - 8x^2 + 5$
Find all roots to the nearest 0.001.
- 16) Given: $f(x) = x^3 + 3x^2 - 10x - 1$
Find all roots to the nearest 0.001
- 17) Given: $f(x) = 100x^3 - 203x^2 + 103x - 1$
Find all roots to the nearest 0.001
- 18) Given: $f(x) = |x-3| + |x| - 6$
Find all roots to the nearest 0.001
- 19) Given: $f(x) = |x| - |x-6| = 0$
Find all roots to the nearest 0.001

Solve the following inequalities

- 20) $x^2 - x - 6 > 0$
- 21) $x^2 - 2x - 5 \geq 3$
- 22) $x^3 - 4x < 0$

For each of the following (problems 23-26)

- a) Sketch the graph of $f(x)$
- b) Sketch the graph of $|f(x)|$
- c) Sketch the graph of $f(|x|)$
- d) Sketch the graph of $f(2x)$
- e) Sketch the graph of $2f(x)$
- 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) Let $f(x) = \sin x$
Let $g(x) = \cos x$
- a) Sketch the graph of f^2
- b) Sketch the graph of g^2
- c) Sketch the graph of $f^2 + g^2$
- 28) Given: $f(x) = 3x+2$
 $g(x) = -4x-2$
Find the point of intersection

29) Given: $f(x) = x^2 - 5x + 2$
 $g(x) = 3 - 2x$

Find the coordinates of any points of intersection.

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

31) Given: $f(x) = x^4 - 7x^3 + 6x^2 + 8x + 9$

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- a) Determine the x- and y-coordinates of the lowest point on the graph.
b) Size the x-window from $[-10, 10]$. Find the highest and lowest values of $f(x)$ over the interval $-10 \leq x \leq 10$
c) Find the highest and lowest values of $f(x)$ if $-2 \leq x \leq 6$.
d) Suppose the *range* is from 10 to 30 in Quadrant II. Determine the x-coordinates (domain) of the function that will cover the range.