William Floyd Union Free School District
of the MASTICS – MORICHES – SHIRLEY

Our rich history builds a promising future!

Kevin M. Coster
Superintendent of Schools

Welcome to AP Calculus Prep (formerly known as Honors Precalculus)!! We are looking forward to getting to know you during the 2017-2018 school year. While you are enjoying your summer, please take the time to complete the attached assignment.

This packet is designed to make the transition into this challenging course as smooth as possible. The problems deal with certain skills and content that you have previously studied in Algebra I, Geometry, and Algebra II. You can use any notes you have to help you solve the review problems. There are also many websites on the internet that can be helpful in completing these problems, such as

www.wolframalpha.com*, *www.khanacademy.org*, *www.purplemath.com*, *www.korpisworld.com

Packets WILL BE COLLECTED on Wednesday September 6th. The assignment will count as a test grade in the first quarter.

In order to receive full credit, you must complete all of the questions and you must show all work to justify your answers. A calculator may only be used on the indicated sections.

At this level, doing homework is more than just getting the problems done it is part of the learning experience. Throughout the year we will be working together as a class to help everyone achieve their goals. So this summer we encourage you to work together with other classmates who will be taking the course with you. What could be better than doing math at the beach? If you have any trouble with the assignment or just have questions or concerns, you can reach me by email at ***crosado@wfsd.k12.ny.us***. I will respond as soon as possible.

We strongly recommend that you do a few problems each day throughout the summer. **Do not leave the entire assignment for the night before school starts.**

Have fun and enjoy your summer. We will see you in September.

Sincerely,

Christine Rosado & Sal Alfredson
Mathematics Department Chairperson *AP Calculus Prep Teacher*
AP Calculus/AP Calculus Prep Teacher
National Board Certified Teacher (NBCT)

240 Mastic Beach Road, Mastic Beach, New York 11951-1028
www.wfsd.k12.ny.us

Directions: Please read each question carefully and record your answers on a separate sheet of paper. You must show ALL work in order to receive full credit and answers should be CLEARLY marked.

Factor each of the following:

1) $x^3 - x + 5x^2 - 5$	2) $x^4 - 16x^2 + 64$	3) $25 - (x + 5)^2$ (Hint: Think Difference of Two Squares)
4) $4x(2x - 1) + 2(2x - 1)^2$ (Hint: Think GCF)	5) $(x^2 + 1)^2 - 4x^2$	6) $x^4 - 4x^3 + x^2 - 4x$
7) $2xe^x - 5e^x$	8) $3x^2 - 5x + 2$	9) $x^3 - 27$

Solve each of the following:

10) $4y^2 + 8y + 2 = 0$	11) $\log_8(x - 5) = \frac{2}{3}$

12) $7e^x - 1 = 13$	13) $3^{3x+5} = 9^{2x+1}$
14) $2sin^2\theta = 1 - sin\theta$ for $0 \leq \theta < 2\pi$	15) $(1.045)^t = 2$
16) $\left(\frac{1}{9}\right)^x = 27^{2x+4}$	17) $3x^2e^x - 12e^x = 0$
18) $2cosx = \sqrt{3}$ for $0 \leq \theta < 2\pi$	19) If $f(x) = 6x^3 + 9x^2 - x + C$ and $f(-3) = 1$, what is the value of C ?

Let $f(x) = 2x + 1$ *and* $g(x) = 2x^2 - 1$. Find each of the following:

20) $f(2)$	21) $g(-3)$	22) $f(t+1)$
23) $f(g(-2))$	24) $g(f(m+2))$	25) $[f(x)]^2 - 2g(x)$

Let $f(x) = x^2, g(x) = 2x + 5,$ *and* $h(x) = x^2 - 1$. Find each of the following:

26) $h[f(-2)]$	27) $f[g(x-1)]$	28) $g[h(x^3)]$

Find the domain and range for each function. Write your answer in INTERVAL notation.

29) $f(x) = x^2 - 5$	30) $f(x) = -\sqrt{x+3}$
31) $f(x) = 3sinx$	32) $f(x) = \frac{2}{x-1}$

Find the x and y intercepts for each.

33) $y = 2x - 5$	34) $y = x^2 + x - 2$
35) $y = x\sqrt{16 - x^2}$	36) $y^2 = x^3 - 4x$

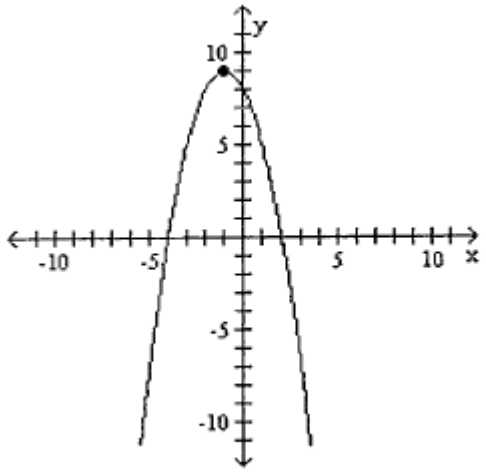
Determine all horizontal asymptotes:

37) $f(x) = \frac{x^2 - 2x + 1}{x^3 + x - 7}$	38) $g(x) = \frac{5x^3 - 2x^2 + 8}{4x - 3x^3 + 5}$	39) $h(x) = \frac{2x^3 - 5x + 1}{x + 4}$

Determine all vertical asymptotes:

40) $f(x) = \frac{x^2}{x^2 - 4}$	41) $g(x) = \frac{5x + 20}{x^2 - 16}$	42) $h(x) = \frac{x - 1}{x^2 + x - 2}$

43) Given the function below, find the domain and range, the x-intercept(s), y-intercept(s), and the intervals where the function is increasing/decreasing.



Evaluate each of the following logarithms:

44) lne^5	45) $\ln\frac{1}{e}$	46) e^{3ln2}	47) $ln\sqrt{e}$	48) $\log_7 7$

Rewrite each of the following as a single logarithm:

49) $\frac{1}{2}ln(x-3)+ln(x+2)-6lnx$	50) $\frac{1}{3}ln(2x+1)-2ln(x-5)$

Find the exact value for each of the following:
(You must have the unit circle memorized or be able to calculate the values without the use of a calculator)

51) a) $sin\left(\frac{7\pi}{6}\right)$	b) $tan\frac{\pi}{2}$	c) $sec\left(-\frac{2\pi}{3}\right)$	d) $sin\left(-\frac{\pi}{2}\right)$
e) $cos\frac{5\pi}{3}$	f) $tan\frac{\pi}{4}$	g) $csc\frac{\pi}{3}$	h) $cos\frac{7\pi}{4}$
i) $tan\frac{\pi}{6}$	j) $cos\frac{3\pi}{2}$	k) $sin\frac{5\pi}{4}$	l) $cos\frac{11\pi}{6}$

52) Use a graphing calculator to approximate all of the function's real zeros. Round your results to three decimal places.

$$f(x) = 3x^6 - 5x^5 - 4x^3 + x^2 + x + 1$$

Inverses:

53) Find the inverse, $f^{-1}(x)$, if $f(x) = 2x + 1$.

54) If $f(x)$ is the inverse of $g(x)$ where $g(x) = \sqrt{4 - x} + a$ and $f(4) = -5$, what is the value of a?

55) Find $f^{-1}(-2)$, if $f(x) = \frac{5}{x-2}$

56) If the graph of $f(2) = 7$ then what is one point that will be on the graph of $f^{-1}(x)$?

Equation of a Line:

57) Find the equation of a line passing through the points $(-3,6)$ *and* $(1,2)$.

58) Use point-slope form to find a line passing through the point $(2,8)$ and parallel to the line $y = \frac{5}{6}x - 1$.

59) Write the equation of the line that passes through the point $(5,-3)$ and is perpendicular to the line $y = \frac{5}{2}x + 5$.

Use a graphing calculator to find any relative minimum/maximum values for each of the following graphs.

60) $f(x) = x^3 - 5x^2 + 7x - 5$

61) $g(x) = x^4 - x^2$

Polar Coordinates:

62) Convert each point to rectangular coordinates:

a) $(2, \pi)$

b) $\left(\sqrt{3}, \frac{\pi}{6}\right)$

63) Convert each point to polar coordinates:

a) $(-1,1)$

b) $(0,2)$

64) Convert the polar equation $r = 3cos\theta$ to rectangular form.

65) a) Complete the table.

b) Sketch the curve represented by the parametric equations (label the initial and terminal points as well as indicate the direction of the curve).

c) Eliminate the parameter for the set of parametric equations.

$x = 2t - 5,\ y = 4t - 7\ ;\ -2 \leq t \leq 3$

t	– 2	– 1	0	1	2	3
x						
y						

Sequences and Series:

66) Simplify each of the following:

a) $\frac{3(4!)}{7!}$ b) $\frac{6!}{(6-2)!2!}$

67) Write the first five terms for each of the following sequences.

a) $a_n = \frac{n-2}{n^2+1}$ b) $b_n = \frac{n!}{(n+2)!}$ c) $c_n = \frac{(-2)^{n+1}}{2n}$

68) Find a formula for the nth term of the sequence $\frac{1}{4}, \frac{2}{9}, \frac{3}{16}, \frac{4}{25}, \ldots$

69) Find the sum of $\sum_{n=1}^{5} \frac{3}{n+2}$

70) Find the sum of the first 12 terms of the geometric series where $b_1 = -4$ and $r = -\frac{1}{2}$.