

Name: _____

Date: _____

AP Calculus Summer Assignment

PUT ALL WORK AND ANSWERS ON A SEPARATE SHEET OF PAPER

Evaluate without using a calculator.

1) $\arcsin(\frac{\sqrt{2}}{2})$

2) $\arctan(1)$

3) $\sec^{-1}(\sqrt{2})$

4) $\arccos(0)$

5) $\cot^{-1}(\frac{1}{\sqrt{3}})$

6) $\arcsin(\frac{4}{5})$

7) $\ln(e^{x-3})$

8) $\log(100^{3x})$

9) $4^{\log_4(x-1)}$

10) $\log_{81} 3$

11) $\log_4(\frac{1}{2})$

12) $\log_{\frac{1}{5}} 125$

Divide using synthetic division.

13) $(x^3 - 4x^2 + 6x - 2) \div (x + 3)$

14) $\frac{2x^4 + 5x^3 - 11x^2 + 14x - 5}{x-2}$

Graph the functions. Find all the intercepts and asymptotes. Give domain and range.

15) $y = \frac{x^2 - 4}{x^2 - x - 12}$

16) $y = \frac{3x-1}{2x^2+x-6}$

Graph the piecewise defined functions by hand.

17)

	$\{3 - x, x \leq 1\}$
$y =$	$\{2x, 1 < x\}$

18)

	$\{4 - x^2, x < 1\}$
$y =$	$\{\frac{3}{2}x + \frac{3}{2}, 1 \leq x \leq 3\}$
	$\{x + 3, x > 3\}$

Use your graphing calculator (or desmos) to find the points of intersection of the graphs. Show all work leading to your solution.

$$\begin{aligned} 19) \quad & 2x - 3y = 13 \\ & 5x + 3y = 1 \end{aligned}$$

$$\begin{aligned} 20) \quad & x^2 + y^2 = 13 \\ & 2x + y = 10 \end{aligned}$$

$$\begin{aligned} 21) \quad & y = 3^{-x} \\ & y = \sin(2x) \end{aligned}$$

Factor completely.

$$22) \quad f(x) = x^2 - 7x + 12$$

$$23) \quad f(x) = 2x^2 - 5x - 12$$

$$24) \quad f(x) = x^4 - 16$$

$$25) \quad f(x) = 6x^2 - 17x + 5$$

$$26) \quad f(x) = 4x^4 - 16x^3 + 18x^2$$

$$27) \quad f(x) = 5\sin^2(x) - 10e^x \sin(x)$$

Simplify each expression:

$$28) \quad \frac{1}{x} + \frac{1}{y} \quad (\text{combine to one fraction}) \quad 29) \quad \frac{2x^2 + 4x}{3x}$$

$$30) \quad \frac{2}{x+3} - \frac{1}{x} \quad (\text{combine to one fraction}) \quad 31) \quad \frac{3x^3 + 16x^2 - 12x}{2x}$$

Evaluate each limit:

$$32) \quad \lim_{x \rightarrow -3} x^2 - 4x + 3$$

$$33) \quad \lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$

$$34) \quad \lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$$

$$35) \quad \lim_{x \rightarrow \infty} \frac{6x^3 - 4x}{2x^3 + 5x^2}$$

36) Explain in words how to determine if a function is continuous at a certain point.

SAMPLE AP EXAM FREE-RESPONSE QUESTION

(non-calculator part)

1. Consider the equation $f(x) = x^4 - 2x^3 - 7x^2 + 20x - 12$.

- a) Use the rational zero theorem to identify all possible rational zeros of the function $f(x)$.
- b) Use the factor theorem in conjunction with synthetic division to identify all rational zeros of the function $f(x)$.
- c) Investigate the symmetry of the function and support your findings algebraically.
- d) Find the values of the constants m and b for which $y = mx + b$ intersects with the function $f(x)$ at the x -intercept that has the largest absolute value and passes through $(-1, -6)$.

SAMPLE AP EXAM FREE-RESPONSE QUESTION

(calculator/desmos part)

2. Given $f(x) = x^5 - 8x^4 + 25x^3 - 38x^2 + 28x - 8$:

- a) Graph the function in the appropriate window and determine its' zeros.
- b) Write the function in its' factored form and determine the multiplicity of each zero.
- c) Describe the effects of these multiplicities on the graphical behavior of the function.
- d) Describe the end behavior of the function using limits.