AP CALCULUS AB

Summer Assignment

Welcome to AP Calculus,

The purpose of this assignment is to have you practice the skills necessary to be successful in AP Calculus. All of the skills in this packet are skills that you should have mastered prior to taking this course. Each question was carefully selected and every question is equally important. There should be **NO** calculators used in completing this packet unless it is otherwise specified. While graphing calculators will be used sometimes in class and on the AP exam, you must be able to complete these problems **BY HAND**.

AP Calculus is a fast paced course that is equivalent to a college level class, and there is a lot of material that must be covered before the AP exam in May. Due to this, we **CANNOT** use valuable class time to reteach these pre-requisite skills. Therefore, make sure you have **MASTERED** every topic in this packet before returning to school in the fall.

This assignment will be collected **ON THE FIRST DAY,** and any portion that I choose, up to and including the entire packet, will be graded as a test. No partial credit will be given. No late submissions will be accepted. You must show **ALL WORK** to support your answers, and you may attach separate sheets to this packet to do so. However, your final answers **MUST** be written next to the questions in this packet. All work shown should be **NEAT** and **ORGANIZED**. If I cannot follow it, you will not receive credit. In addition, you may be tested on this material at any moment during the first week of school.

If you find that you have difficulty in doing this assignment, or if you believe that it is too long, then it may be in your best interest to pursue other class options.

~ Mr. Haralson

AP CALCULUS DIAGNOSTIC TEST

All students must take the online Calculus Readiness Test and bring a print-out of their results to the first day of class. The test consists of 40 multiple choice questions and covers topics from Algebra, Geometry, Trigonometry, and Pre-Calculus. This test will **NOT** factor into your grade, so you should take it honestly. Since it does not count, there is no reason to take the test multiple times.

The test can be found at the following link:

http://defunct.mdtp.ucsd.edu/test_new/?show_instructions=3

After you finish the test, you will be able to print your results on the final page. Again, you must bring a copy of these results to hand in on the first day of class along with the summer assignment.

PRECALCULUS REVIEW

Linear Equations

Write the linear equations for the given information in Standard Form, Slope Intercept Form, AND Point Slope Form:

1. Through (-4,1) and (2,-5)

2. Through (2,-3) and (-3,7)

3. Through (2,8) and Parallel to $y = \frac{5}{6}x - 1$

4. Through (1,7) and Parallel to $y = 3x + 5$

5. Through (4,7) and Perpendicular to $y = -2x + 9$

6. Through (3,2) and Perpendicular to $2x - 5y = 3$

Polynomials

Factor the following completely:

1. $x^2 + 12xy + 20y^2$

2. $x^2 + 3xy - 10y^2$

3. $2x^2 + 11x + 12$

4. $5x^2 + 9x - 2$

5. $16x^2 - 25$

6. $121x^2 - 36y^2$

7. $16x^2 + 56xy + 49y^2$

8. $8x^4 + 44x^3 + 56x^2$

9. $x^3 + 1$

10. $3x^3 - 81$

11. $3xy + 3y + 2x + 2$

12. $2x^2y - 18y - 4x^2 + 36$

13. $x^4 - 2x^2 - 8$

14. $x^6 + 6x^3 + 5$

15. $x + 5\sqrt{x} + 4$

16. $x^{\frac{2}{3}} - x^{\frac{1}{3}} - 6$

17. $4x^2 - 25$

18. $(x-3)^4 + 2(x-3)^2 - 8$

Divide using a method of your choice:

1. $\frac{6s^4-3s^3+5s^2+2s-6}{3s^2-2}$

2. $\frac{s^3-s^2-10s+10}{s-3}$

3. $\frac{2s^4-3s^2+7s+8}{s^2+s-3}$

4. $\frac{4s^3+2s^2-4s+3}{2s+3}$

5. $\frac{4s^4+3s^3+2s+1}{s+2}$

6. $\frac{2s^3+42-4s}{s+3}$

Functions

Use the following functions for these problems:

$\dagger(x) = 3 - 5x - 2x^2$ $\quad g\ x \in) \frac{x}{2x+6}$ $\quad M(x) = \sqrt{1 - x^2}$

1. $f(4)$ 2. $f(0)$ 3. $f(-3)$ 4. $f(6 - x)$

5. $f(7 - 4x)$ 6. $f(x + h)$ 7. $g(0)$ 8. $g(-3)$

9. $g(10)$ 10. $g(x^2)$ 11. $g(x + h)$ 12. $g(x^2 - 3x + 1)$

13. $h(0)$ 14. $h(-\frac{1}{2})$ 15. $h(\frac{1}{2})$ 16. $h(x^2 - 2x)$

Compute $\dagger(g(x))$ and $g(\dagger(x))$ **for the following functions:**

1. $f(x) = 4x - 1$, $g(x) = \sqrt{6 + 7x}$

2. $f(x) = 5x + 2$, $g(x) = x^2 - 14x$

3. $f(x) = x^2 - 2x + 1$, $g(x) = 8 - 3x^2$

4. $f(x) = x^2 + 3$, $g(x) = \sqrt{5 + x^2}$

Find the inverse $\dagger^{-1}(x)$ **of the following functions:**

1. $f(x) = 6x + 15$

2. $f(x) = 3 - 29x$

3. $f(x) = x^3 + 6$

4. $f(x) = 4(x - 3)^5 + 21$

5. $f(x) = \sqrt[5]{9 - 11x}$

6. $f(x) = \sqrt[7]{5x + 8}$

Determine whether the following functions are even, odd, or neither:

1. $f(x) = 2x^4 - 5x^2$

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

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

4. $f(x) = 2\cos x$

5. $f(x) = x\,|x|$

6. $f(x) = |x| - 1$

7. $f(x) = \frac{s_2}{1-s^2}$

8. $f(x) = \frac{s}{1-s^2}$

Determine the domain and range of each function. Write in interval notation:

1. $f(x) = x^2 - 5$

2. $f(x) = -\sqrt{x+3}$

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

4. $f(x) = \frac{2}{s-1}$

Find all vertical asymptotes for the function:

1. $f(x) = \frac{1}{s^2}$

2. $f(x) = \frac{s_2}{s^2-4}$

Find all horizontal/slant asymptotes for the function:

1. $f(x) = \frac{s_2-2s+1}{s^3+s-7}$

2. $f(x) = \frac{5s_3-2s^2+8}{4s-3s^3+5}$

Perform the following operations:

1. $\frac{1}{s+1} + \frac{s}{s-6} - \frac{5s-2}{s^2-5s-6}$

2. $\frac{3s+5}{s+5} - \frac{s+1}{2-s} - \frac{4s^2-3s-1}{s^2+3s-10}$

Solve the following equations:

A CALCULATOR MAY BE USED FOR THE FINAL ANSWER ONLY. ROUND TO THE HUNDREDTH S PLACE.

1. $\log_3(x-2) = 3$

2. $\log_4(17x-4) = 3$

3. $\log_2 x - \log_2(\sqrt{x}-1) = 2$

4. $\log_5(x-3) = \log_5 \sqrt{x+3}$

5. $4 + 3^{s+1} = 8$

6. $5e^s = 22$

7. $10^{3s-1} = \frac{5}{7}$

8. $2e^{3s-5} = 7$

9. $\frac{15}{1+e^{-2x+1}} = 4$

10. $\frac{10}{1+e^{-x}} = 2$

11. $x^2 2^s - 2^s = 0$

12. $x^2 e^s - 5xe^s - 6e^s = 0$

13. $e^{2s} - 3e^s + 2 = 0$

14. $6 - \log_5(3x-2) = 4$

15. $\log_2 3 + \log_2 x = \log_2 5 + \log_2(x-2)$

16. $\log x + \log(x-1) = \log 4x$

17. $\ln(4x-5) = 0$

18. $1 + \log(3x-1) = \log(2x+1)$

19. $\ln(\ln x) = 3$

20. $2^{2s} = 20^{s-1}$

Trigonometry

Find the exact values of the following:

1. $\sin 30°$
2. $\cos 330°$
3. $\tan(-135°)$
4. $\sec(-135°)$

5. $\sin\frac{5n}{6}$
6. $\csc\frac{2n}{3}$
7. $\sec\frac{-n}{3}$
8. $\tan\left(-\frac{2n}{3}\right)$

9. $\csc 270°$
10. $\sec 180°$
11. $\cot(-90°)$
12. $\tan 360°$

Simplify the following identities:

1. $\sin x + \sin x \cot^2 x$

2. $\sin x \csc x - \cos^2 x$

3. $\dfrac{1 - \dfrac{1}{\sec^2 x}}{\sec s \sin^2 s}$

4. $\dfrac{\sin s \tan s}{\dfrac{\sin^2 x}{\csc^2 x} + \dfrac{\cos^2 x}{\csc^2 x}}$

5. $\dfrac{\sin s + \tan s}{1 + \sec s}$

6. $\dfrac{\cot s + 1}{\sin s + \cos s}$

Graph TWO periods of the following functions:

1. $y = -\cos 3x$

2. $y = \tan 8 - 1$

3. $y = \sin\left(x + \frac{n}{2}\right) + 3$

4. $y = -3 \sin 2x + 1$

Find ALL solutions on the interval $[0, 2u]$**:**

1. $\tan^2 x - 3 = 0$

2. $2\cos^2 x - \sqrt{3}\cos x = 0$

3. $\sin^2 x - \sin x = 2$

4. $\cos^2 x + \cos x = \sin^2 x$

5. $3\tan^3 x - 3\tan^2 x - \tan x + 1 = 0$

6. $2\cos 2x - \sqrt{3} = 0$

AP CALCULUS SELF TEACHING

The ability to teach yourself a mathematics topic is a skill that will be both necessary and invaluable throughout college and the rest of your life. It will also be necessary in AP Calculus, as the amount of material and limited amount of time require students to become masters of their own education. To prove that you have to ability to learn independently, you will be required to study the first topics of calculus on your own, and will be tested on these topics without any review in the classroom. You are free to use any resources you want in order to master the topics listed below, such as the textbook, websites, etc. When you feel you are ready, you must complete the problems below. These may also count toward your summer assignment test grade.

Topics

- Limits
- One Sided Limits
- Infinite Limits
- Limits At Infinity
- Finding Limits From Graphs

Limits

1. $\lim_{s\to 2} \frac{s^2-4}{s-2}$

2. $\lim_{s\to 3} \frac{s^2-4s+3}{s-3}$

3. $\lim_{s\to 4} \frac{s-4}{s}$

4. $\lim_{s\to 1} \frac{s^3-4}{s}$

5. $\lim_{s\to 0} \frac{s^2-s-2}{s^2-2s}$

6. $\lim_{s\to 0} \frac{\sin 3s}{s}$

7. $\lim_{s\to 0} \frac{(6+s)^2-36}{s}$

8. $\lim_{s\to 4} \frac{\sqrt{s}-2}{s-4}$

9. $\lim_{s\to 8} \frac{2s^2-17s+8}{8-s}$

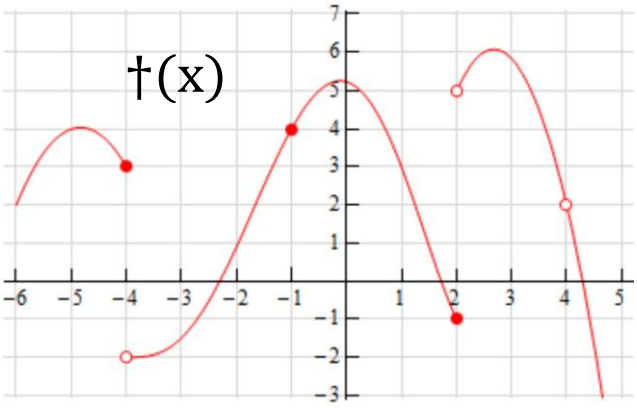
10. $\lim_{s\to -3} \frac{\sqrt{2s+22}-4}{s+3}$

One Sided Limits

$$g(x) = \begin{cases} 2x + 5, & x \in 3 \\ x^3 - 8x + 1, & x \; X \; 3 \end{cases}$$

1. $\lim_{s \to 3^+} g(x)$

2. $\lim_{s \to 3^-} g(x)$



3. $\lim_{s \to -4^-} f(x)$

4. $\lim_{s \to -4^+} f(x)$

5. $\lim_{s \to 1^-} f(x)$

6. $\lim_{s \to 2^+} f(x)$

7. $\lim_{s \to 4^+} f(x)$

8. $\lim_{s \to 2^-} f(x)$

Infinite Limits

$\dagger(x) = \frac{2x}{6+x}$ $\quad g(x) = \frac{x+3}{(x+1)^2}$ $\quad M(x) = \frac{x+7}{x^2-4}$

1. $\lim_{s\to -6^-} f(x)$

2. $\lim_{s\to -6^+} f(x)$

3. $\lim_{s\to -6} f(x)$

4. $\lim_{s\to -1^-} g(x)$

5. $\lim_{s\to -1^+} g(x)$

6. $\lim_{s\to -1} g(x)$

7. $\lim_{s\to 2^-} h(x)$

8. $\lim_{s\to 2^+} h(x)$

Limits at Infinity

1. $\lim_{s\to\infty} 4x^7 - 18x^3 + 9$

2. $\lim_{s\to-\infty} 4x^7 - 18x^3 + 9$

3. $\lim_{s\to\infty} \frac{8-4s^2}{9s^2+5s}$

4. $\lim_{s\to-\infty} \frac{8-4s^2}{9s^2+5s}$

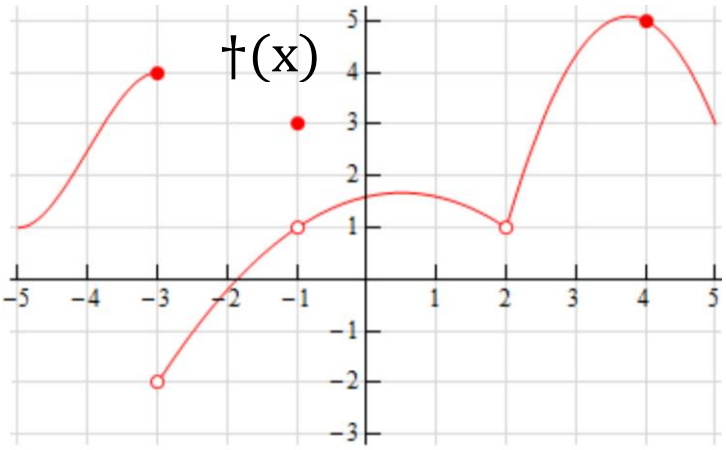
5. $\lim_{s\to\infty} \frac{3s^7-4s^2+1}{5-10s^2}$

6. $\lim_{s\to-\infty} \frac{3s^7-4s^2+1}{5-10s^2}$

7. $\lim_{s\to\infty} \frac{20s^4-7s^3}{2s+9s^2+5s^4}$

8. $\lim_{s\to-\infty} \frac{20s^4-7s^3}{2s+9s^2+5s^4}$

Finding Limits From Graphs



1. $\lim_{s\to -3^-} f(x)$

2. $\lim_{s\to -3} f(x)$

3. $\lim_{s\to -1^+} f(x)$

4. $\lim_{s\to 4} f(x)$

5. $\lim_{s\to -1} f(x)$

6. $\lim_{s\to 2^+} f(x)$

7. $\lim_{s\to 3^+} f(x)$

8. $\lim_{s\to 2} f(x)$