2026 – 2027

AP Calculus BC Summer Assignment (students moving from Calc AB to Calc BC)

Resources Needed: Graphing Calculator

As you already know from your time in Calculus AB, Calculus is the mathematical study of continuous change. You already know a lot about the two traditional branches – differential calculus and integral calculus. During this course we will explore these two areas in more depth and, later in the year, apply calculus concepts to less familiar types of functions including parametric and polar, as well as to infinite series.

If you feel you might need a quick refresher on Calc I concepts, here is a video to get you back in the swing…

https://www.youtube.com/watch?v=SOkMGWCLqoc

Your summer assignment is twofold. First, take a break this summer! Everyone needs one – relax, enjoy, and recharge. Second, try out the attached problem sets to review and sharpen your skills. If you would like to get the assignment out of the way first, and then relax, do so – just review your work at the end of August to remind yourself. Alternately, pretend you are not allowed to work on it until the last 2 weeks of break and forget about it for now.

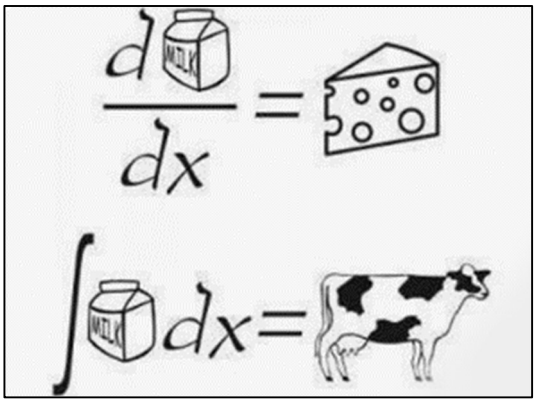
The attached problem sets will be the start of our class Calculus crossword we will work on throughout the year. In September, you will get a chance to review with classmates and get us started off strong! You are welcome to work with a friend on this assignment, but you must show your own work.

If you are stuck or have questions, reach out. I look forward to working with you next school year!

Mrs. Meyers

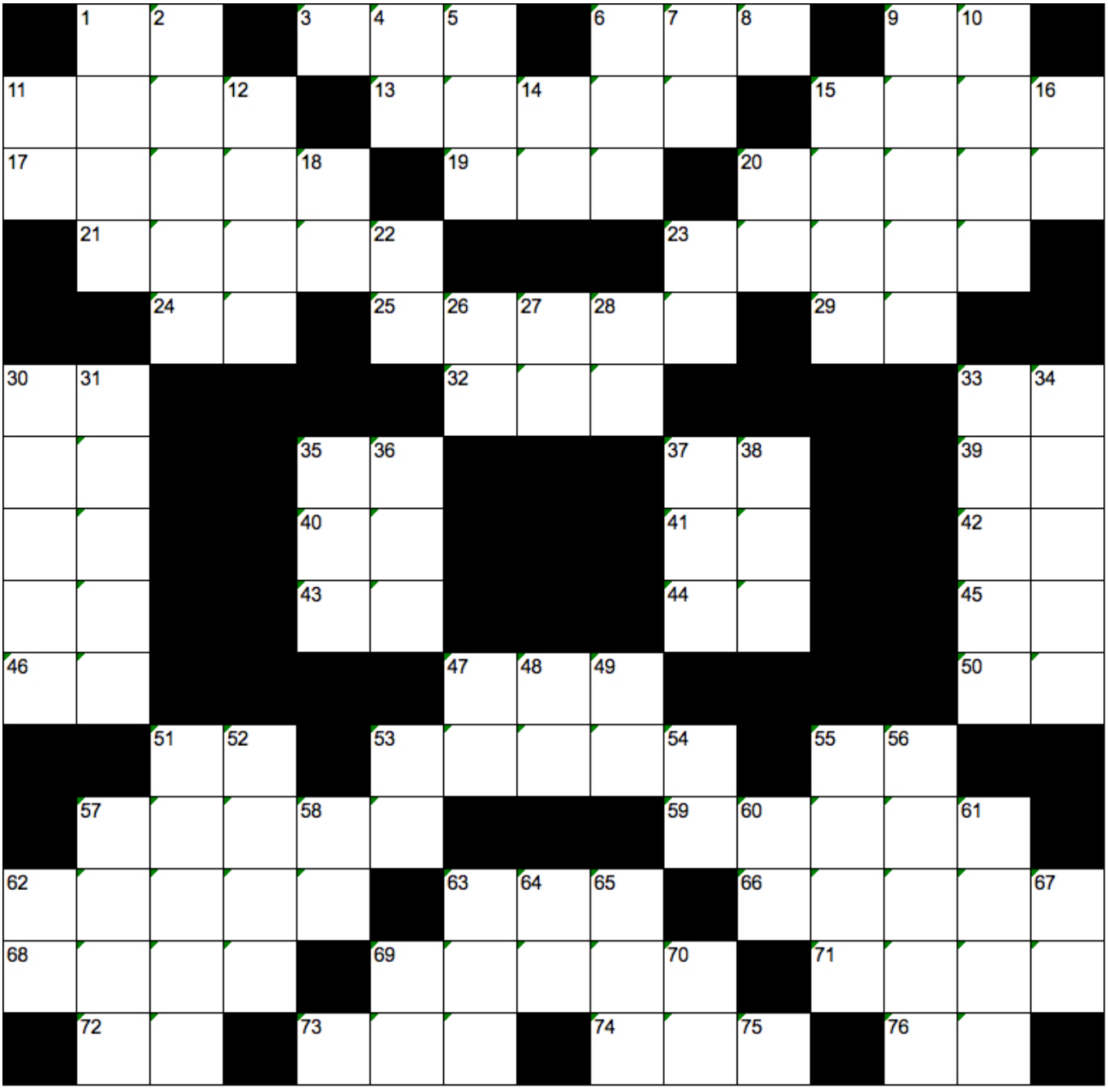
Katherine.meyers@sno.wednet.edu

Summary of Calculus



Across and Down

Only digits (0 – 9) and negative signs are allowed. If an answer is an integer, use leading zeros to make the answer fit. (Ex: If 4 digits are required and your answer is 46,enter 0046.) If an answer has decimal places, the decimal point is dropped and trailing zeros are used to make the answer fit to the required number of decimal places which is specified in the problem. (Ex: If 2 decimal places are required and your answer is 12.4682, round to 12.47 and enter 1247. If one decimal place is required and your answer is 15, write 15.0 and enter 150. If one decimal place is required and your answer is 0.5, wrote 05.)



AP Calculus – Across and Down



Clue Set: #1

Topic: Limits

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Across

None

Down

D8. Find $\lim_{x\to 0}\left(e^x-\cos x\right)\left(e^x-\sin x\right)$.

D20. Find $\lim_{x\to-\infty}\dfrac{3x^3}{\sqrt{x^6-x^3+15}}$. Enter 99 if you believe the answer to be undefined.

D33. Find $\lim_{x\to 3}\dfrac{-x^3+1.62x^2+4.14x}{x-3}$.

D48. Find $\lim_{x\to\infty}\dfrac{6x}{\sqrt{1600x^2-8x+50}}-\lim_{x\to-\infty}\dfrac{6x}{\sqrt{1600x^2+8x-50}}$ (one decimal place).

D69. The whole numbers a and b each have one digit. If $\lim_{x\to 3} f(x)$ and $\lim_{x\to 1} g(x)$ both exist and

$$f(x)=\begin{cases}bx^2, x\ge 3\\ ax+6,\ x<3\end{cases} \text{ and } g(x)=\begin{cases}-a\cos(\pi x), x\ge 1\\ b\sec^2\left(\dfrac{\pi x}{4}\right), x<1\end{cases}$$, write a then b.

AP Calculus – Across and Down



Clue Set: #3

Topic: Derivatives – Chain Rule

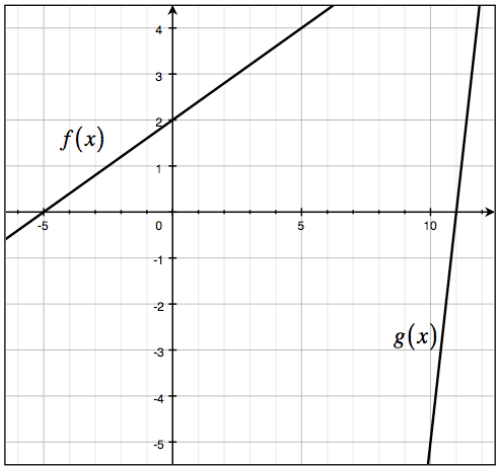
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Across

A1. If $h(x)=f\left(g\left(\frac{x}{2}\right)\right)$ and $g(0)=4$, $g'(0)=5$, $f'(4)=16$, find $h'(0)$,

A35. If $f(6)=9$ and $f'(6)=-6$, and $g(x)=x\sqrt{f(2x)}$, find $g'(3)$.

A44. Using the graph to the right, if $h(x)=5f(g(5x))$, find $h'(2)$.



Down

D67. **(Sci. Calc.)** If $f(x)=100\left(\frac{x-3}{x+4}\right)^3$, find $\lim_{x\to 1/2}\frac{f(x)-f(1/2)}{x-1/2}$ to the nearest integer.

AP Calculus – Across and Down



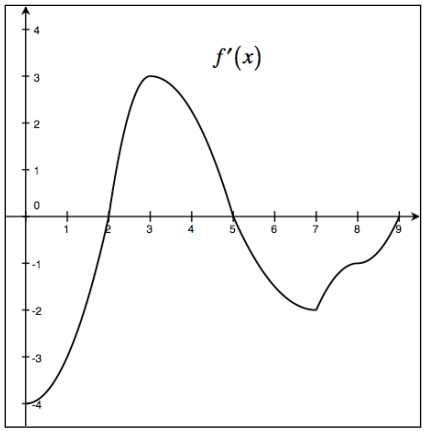
Clue Set: #10

Topic: Function Analysis

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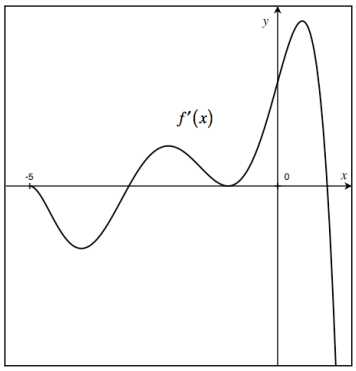
Across

A40. The graph of $f'(x)$, defined on [0, 9] is on the right. The graph of $f(x)$ is increasing and concave up on the interval $[a,b]$. Write a then b as a two-digit number.



A68. The function $f(x)=90x^2-x^3-1500x$ is increasing on the interval $[a,b]$ where a and b are two-digit numbers. Write a, then b as a four-digit number.

D14. The continuous graph to the right is $f'(x)$, defined on the interval $[-5,\infty)$. Find the two-digit number EI representing the number of relative extrema and number of inflection points of (for instance, 3 relative extrema and 2 inflection points would have an answer of 32).



D55. Let $f'(x)$ be the product of 21 terms defined by:

$$f'(x)=(x+4)(x+3)(x+2)\ldots(x)(x-1)\ \ldots\ (x-14)(x-15)(x-16).$$

If $x = a$ is the location of the leftmost relative maximum to f and $x = b$ is the location of the rightmost relative maximum to f, write a then b. For instance, if you think that $a = -1$ and $b = 10$, then your answer would be –110.

AP Calculus – Across and Down



Clue Set: #11

Topic: Absolute Extrema

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Across

None

Down

D4. Find the largest (positive) slope of $f(x)=\frac{-5x^3}{12}-\frac{15x^2}{4}+\frac{35x}{4}+1$ on $[-5,3]$.

D11. What is the smallest value of $f(x)=\cos^2 x-\sin x$ on $[0,2\pi]$?

D37. A particle is moving along the x-axis with position function $x(t)=\frac{1}{100}\left(\frac{t^4}{24}-\frac{t^3}{2}+\frac{21t}{2}+1\right)$. What is the velocity when the particle has its minimum acceleration (3 decimal places)?

AP Calculus – Across and Down



Clue Set: #12

Topic: Optimization

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Across

A21. **(Sci. Calc.)** An amusement park has an incentive program to increase attendance. The incentive is represented by the variable x that is normally set at 0. On those days, the park averages 1,500 adults paying \$25 and 3,500 kids paying \$16. For every unit increase in x, the adult price drops by \$2 and 400 more adults enter the park. For every unit increase in x the child price drops by \$3 and 500 more kids enter the park. The operating cost of the park is \$23,350 daily no matter how many people enter the park. What is the maximum profit of the park (to the nearest dollar) ?

A42. On January 15, 2009, Captain Chesley Sullenberger (Sully) miraculously landed US Airways flight 1549 on the Hudson river after striking a flock of geese. The story quickly went viral. It is estimated that the rate that people learned of the story through their TV's, Internet, and cellphones was $r(t)=\dfrac{102400t}{1024+t^2}$, where t, measured in minutes, was the amount of time from when the story first broke, and $r(t)$ is measured in thousands of people per minute. At what value of t was this rate a maximum?

Down

D61. **(Sci. Calc.)** A cylindrical natural gas container must contain a volume of 7,170 ft^3. What should its radius be so that the metal used to make the container (top, bottom and sides) is a minimum (2 decimal places).

AP Calculus – Across and Down



Clue Set: #13

Topic: L'Hospital's Rule

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Across

A41. Find $\lim_{x\to 0}\dfrac{\frac{5}{2}e^{2x}-5x^2-5x-\frac{5}{2}}{\frac{-\sin 2x}{8}+\frac{x^3}{6}+\frac{x}{4}}$.

A72. Find $\lim_{x\to 0}\dfrac{\sin^{-1}\left(3x^2\right)}{\tan^{-1}\left(5x^2\right)}$

Down

D58. Find $\lim_{x\to 0^+}\dfrac{16^{\sqrt{x}}-1}{32^{\sqrt{x}}-1}$.

AP Calculus – Across and Down



Clue Set: #14

Topic: Riemann Sums

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Across

None

Down

D16. Using the data in the table to the right, the midpoint Riemann approximation with two rectangles gives the same result as the trapezoidal approximation with 4 trapezoids. Find the value of k.

x	1	3	5	7	9
y	−2	−3	k	8	−8

D75. If $\int_{-\pi/3}^{\pi/3} \cos x\,dx$ is approximated with 6 Riemann sum rectangles, what is the difference between the approximations, if first, left Riemann sums are used and then right Riemann sums are used.

AP Calculus – Across and Down



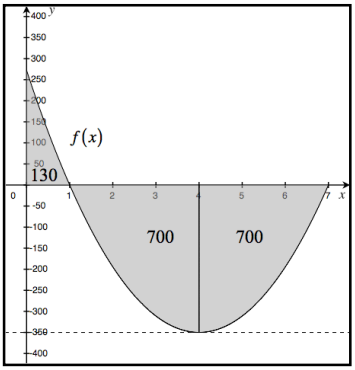
Clue Set: #16

Topic: Accumulation Function

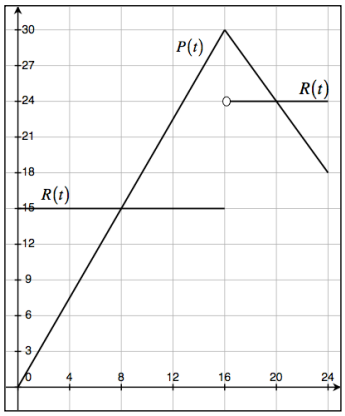
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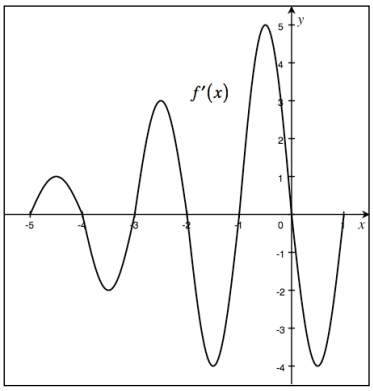
A11. Let $f(x)$ be given in the figure to the right. The areas between the curve and $f(x)$ are given. If $F(x)=\int_0^x f(t)\,dt$, find $F'(4)$.



A29. Rocks are placed on a conveyor belt to be pulverized by several pieces of machinery. Let $R(t)$, made up of 2 discontinuous lines as shown by the graph to the right, represent the rate that rocks are placed on the conveyor belt. Let $P(t)$, also made up of two continuous lines represent the rate that the rocks are pulverized. $R(t)$ and $P(t)$ are measured in rocks per minute and t is measured in minutes on the interval $0 \le t \le 24$. If there were 20 rocks on the conveyor belt when the machinery was started up, how many rocks are on the conveyor belt waiting to be pulverized when this number is a maximum?



A33. The graph of $f'(x)$ is shown in the figure to the right. What is the value of x for which $f(x)$ has its absolute minimum?



Down

None

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AP Calculus – Across and Down



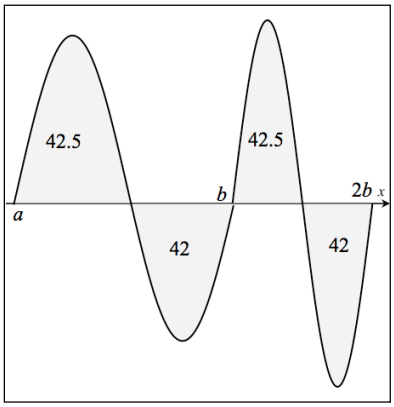
Clue Set: #19

Topic: Average Value

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Across

A23. In the graph of $f(x)$ to the right (not to scale), the average value of f on the interval $[a,b]$ is $\frac{1}{126}$. The average value of f on the interval $[a,2b]$ is $\frac{1}{92}$. Find a and b and write the two values left to right.



A32. **(Gr. Calc.)** Find the average value of $y=\frac{4\ln\left(20x^2+1\right)}{x}$ on $(0,7]$ accurate to 2 decimal places. Enter 999 if you feel that the answer is infinite.

Down

D7. **(Gr. Calc**.) Find the average value of $f(x)=\frac{7\sin 2x-2\cos 3x+2}{10}$ on the interval $[0,2.4]$. (1 dec. pl.)

D64. **(Gr. Calc.)** The temperature in Las Vegas, Nevada is given by the formula $T(t)=18\sin\left(\frac{\pi t}{6}-2\right)+91$ where t represents the number of hours after 9 AM and $0\le t\le 12$. Frank plays a round of golf in which he is on the course from 11:15 AM until 3:27 PM. What is the average temperature (nearest degree) during the time he is on the course?

AP Calculus – Across and Down



Clue Set: #22

Topic: Volume

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Down

D1. **(Gr. Calc.)** Find the volume to the nearest integer if the area between the positive y-axis and the curves $f(x) = 24 - x^2$ and $g(x) = 2x$ is rotated about the x-axis.

D15. **(Sci. Calc.)** The first-quadrant area between the curves $y = 17\cos x$, $y = 17\sin x$, and the y-axis is the base of a solid whose cross-sections perpendicular to the x-axis are squares. Find the volume of the solid.

D53. The area between the curve $y = \frac{10}{x}, x = 5$, the x-axis, and the line $x = k$ where $k > 5$, is the base of a solid with cross sections perpendicular to the x-axis creating right isosceles triangles (the distance from the x-axis to the curve is the leg of the triangle). Find the value of k if this area is 7.5.

D56. **(Sci. Calc.)** The first-quadrant area between the curve $y = 5 + \sqrt{x}$ and the x-axis is rotated about the x-axis to create a solid. How fast is the volume of this solid changing when $x = 4$ and x is changing at the rate of 6 units per second (2 decimal place accuracy)?