

AP Calculus AB Review

How At Home Learning will work:

Check Google Classroom regularly for scheduled review to be posted every few days. The review is meant for you to continue to practice your skills and stay up-to-date as much as possible.

The work you complete will count for **positive credit only**, this means it cannot hurt your overall grade if you are unable to complete it. Submit your work through Google Classroom as you finish by taking pictures of your paper and posting it to the appropriate assignment.

If you have questions, please post those questions to Google Classroom. We also strongly encourage you to seek out other students to form study groups via Google Meet, Zoom, etc. for additional support. We will be checking our Google Classrooms regularly to answer any questions that you may have. You may also email us directly. Attached is a guideline for appropriate interaction when communicating with other students and staff through technology.

Sincerely,

OHS Math

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Remote Learning Guidelines

Dear students,

As we move to learning remotely it is important to remind ourselves that our reason for being together as a class and school is to support each others' learning. As such, our interactions online, like our interactions in person, are opportunities to present our best selves.

Before writing or posting anything online make certain what you write or post contributes to our learning. It should be on topic. It should not distract. Humor should only be used when it helps learning and engagement. If you are unsure whether you should write or post something in a public forum (google classroom, shared doc, group email thread, social media, etc.) check with a trusted adult (such as a parent or teacher) first.

Jefferson Union High School District has a detailed technology use policy, but if you always check that what you are doing...

...is on topic,

...is respectful,

...and motivated by an interest in learning and helping others learn,
you will likely never violate that policy and face consequences.

Remember, when we interact face-to-face we are able to read physical cues that provide additional meaning and context to what we are saying and doing. Face-to-face interactions allow for clarification and forgiveness. Online actions and statements do not reliably do this. Things you write and post online may not be interpreted as intended, they exist indefinitely, and can be taken out of context. Please be mindful, and pause to consider if misunderstanding is possible before you hit send/post/enter.

Limits

1) $\lim_{x \rightarrow 3} \frac{x^2}{x-3} + \frac{5x-6}{3-x}$

2) $\lim_{h \rightarrow 0} \frac{10 - \sqrt{100+h}}{h}$

3) Find $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - 5x + 6}$

4) find $\lim_{x \rightarrow 5} \frac{\sqrt{x} - \sqrt{5}}{x - 5}$

5) How can you show that a limit does not exist?

6) $\lim_{x \rightarrow a} f(x) = L$ If and only if what?

7) If $\lim_{x \rightarrow 5} f(x) = 10$, does it necessarily mean that $f(5) = 10$? Explain or give a counter example.

8) To find $\lim_{x \rightarrow \infty} \frac{x+12}{x}$, what must I do first?

9) What is the $\lim_{x \rightarrow 0} \sin x$? $\lim_{x \rightarrow 0} \cos x$? $\lim_{x \rightarrow 0} \frac{\sin x}{x}$? $\lim_{x \rightarrow 0} \frac{\cos x - 1}{x}$?

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

7) $\lim_{x \rightarrow \infty} \frac{x^5 + 6x + 1}{5x - 2x^3}$

Derivatives

For 1-15, find the derivative:

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

2) $f(x) = \frac{1}{x^{99}}$

3) $f(x) = (\sqrt[4]{x})^5 + 1$

4) $f(x) = \sqrt{x} + \frac{1}{\sqrt{x}}$

5) $f(x) = (4x^6 + 3x^5 - 7)(3x^2 + \frac{4}{x^2})$

6) $f(x) = \frac{\sqrt{x} + 3}{8x^2 + 14x - 90}$

7) $f(x) = \frac{3x-1}{4x+5}$ Find $f'(5)$

8) If $h(x) = f(x) \cdot g(x)$ and $j(x) = \frac{f(x)}{g(x)}$ and $f(2) = 6, f'(2) = -3, g(2) = -4, g'(2) = 5$

Find $h'(2)$ and $j'(2)$

9) $f(x) = \sin x + 3 \cot x$

10) $f(x) = \frac{3}{4}x^4 \sin x$

11) $f(x) = 5 \sec x + 2 \csc x$

12) $f(x) = \sqrt{x} \cos x$

13) $f(x) = \frac{\sin x}{\sqrt{x}}$

14) $f(x) = \frac{\sin x + 1}{\cos x - 1}$

15) $f(x) = \sec x \sin x$

- 16) Find $\frac{dy}{dx}$ if $y = \sin^3(3x - 1)$.
- 17) Find $f'(2)$ if $f(x) = \sqrt{5x^2 + 3x - 1}$.
- 18) Find the slope of the tangent line to the curve $y = (x^2 - 3)^5$ at the point $(-1, -32)$.
- 19) Find $\frac{dy}{dx}$ if $x^2y^3 - xy = 10$.
- 20) Find y' if $y = \sin x + \cos y$.
- 21) Find y' at $(-1, 1)$ if $x^2 + 3xy + y^2 = -1$.
- 22) Find the slope of the tangent line to the curve $x^2 + y^2 = 25$ at the point $(3, -4)$.
- 23) Find the first, second, and third derivatives of $f(x) = 5x^4 - 3x^3 + 7x^2 - 9x + 2$.
- 24) Find the first, second, and third derivatives of $y = \sin^2 x$.
- 25) $\sin x\pi + x^2y^2 = 9$ at point P $(1,3)$
- Find slope of tangent line.
 - Find equation of tangent line.
- 26) $x^3 + y^3 = 6xy$, Find $\frac{dy}{dx}$, Find tangent line at $(3,3)$.
- 27) $3x^2y - 4x = y$ Find y'' at point $(1,2)$.

Integrals

1) $y = \int_7^x 3t^2 \sin t \cos t dt$ Find $\frac{dy}{dx}$

2) $y = \int_2^{x^2} 3t^2 \sin t \cos t dt$ Find $\frac{dy}{dx}$

3) $y = \int_x^{10} 3t^2 \sin t \cos t dt$ Find $\frac{dy}{dx}$

4) $y = \int_7^{10} 3t^2 \sin t \cos t dt$ Find $\frac{dy}{dx}$

5) $\int_2^7 \frac{(x^4 - 2)^2}{x^3} dx$ Evaluate the integral

I. Find the following integrals.

1. $\int (5x^2 - 8x + 5) dx$

2. $\int (-6x^3 + 9x^2 + 4x - 3) dx$

3. $\int (x^{\frac{1}{2}} + 2x + 3) dx$

4. $\int \left(\frac{8}{x} - \frac{5}{x^2} + \frac{6}{x^3} \right) dx$

5. $\int \left(\sqrt{x} + \frac{1}{3\sqrt{x}} \right) dx$

6. $\int (12x^{\frac{3}{4}} - 9x^{\frac{5}{3}}) dx$

7. $\int \frac{x^2 + 4}{x^2} dx$

8. $\int \frac{1}{x\sqrt{x}} dx$

II. Evaluate the following definite integrals.

1. $\int_1^4 (5x^2 - 8x + 5)dx$

2. $\int_1^9 (x^{\frac{3}{2}} + 2x + 3)dx$

3. $\int_4^9 (\sqrt{x} + \frac{1}{3\sqrt{x}})dx$

4. $\int_1^4 \frac{5}{x^3} dx$

5. $\int_{-1}^2 (1 + 3t)t^2 dt$

6. $\int_{-2}^1 (2t^2 - 1)^2 dt$

11)

x	0	1	2	3	4	5	6	7	8
f(x)	-17.4	-13.1	-5.3	-2.1	1.8	2.9	8.7	12.8	20.1

(a) Use the table to estimate $\int_0^8 f(x)dx$ using 4 equal subintervals with Right Endpoints.

(b) Use the table to estimate $\int_0^8 f(x)dx$ using 4 equal subintervals with Left Endpoints.

(c) Use the table to estimate $\int_0^8 f(x)dx$ using 4 equal subintervals with Midpoints.

(d) Use the table to estimate $\int_0^8 f(x)dx$ using 4 equal subintervals with Trapezoids.

Derivative Applications

1) $s(t) = 2t^3 - 15t^2 + 36t + 8$ is the position function (with $t \geq 0$) of a particle moving along a horizontal line, where t is measured in seconds, and $s(t)$ measured in inches. Tell me everything you know about the motion of the particle.

10) Find the absolute extrema of f on the given interval: $f(x) = -10x^2 + 5x + 29$ on $[-3, 4]$

11) Find the intervals if increasing/decreasing for f . $f(x) = -\frac{1}{3}x^3 + 6x^2 - 11x - 50$

16) Sketch the graph of the function with the following characteristics:

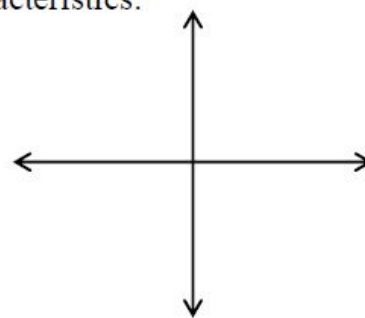
$$h(2) = h(4) = 0$$

$$h'(x) > 0 \text{ if } x < 3$$

$h'(3)$ does not exist.

$$h'(x) < 0 \text{ if } x > 3$$

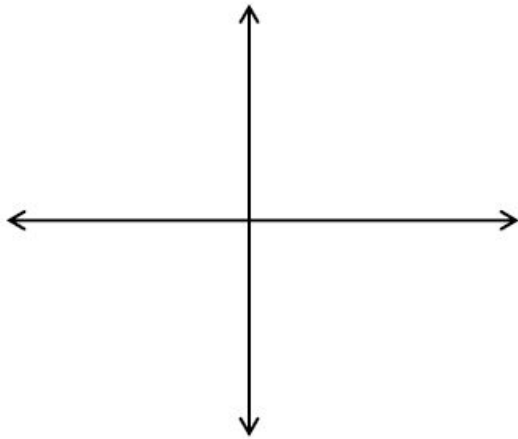
$$h''(x) > 0 \text{ if } x \neq 3$$



17) Find the relative minimum and relative maximum for $f(x) = 2x^3 + 3x^2 - 12x$.

19) Find all intervals where $g(x) = 8x^3 - 2x^4$ is concave down and concave up.

- 20) Sketch the graph of $f(x) = x^3 - 3x + 1$. Label the y-intercept, relative min., and relative max. on the graph.



- 8) A cylindrical aluminum cup is made from 12 squared inches of aluminum. Maximize the volume of this cup.
- 9) A rectangular sheet of metal measuring 10 inches by 16 inches. Cut off square corners to fold up into a box. Maximize the volume.
- 12) A farmer wants to enclose a rectangular field with 600 ft of fencing. He also wants two fences through the field, both parallel to one of the sides, to cut the field into 3 equal pieces of land. Find the largest possible area of the land that he can enclose.