

Summer Review Packet

For Students Entering AP Calculus-AB

This Review Packet is MANDATORY and will be due on the first day of class

Complete all work in the packet and have it ready to be turned in to your Calculus teacher on the first day of class 2021- 2022 school year. SHOW ALL WORK! An answer alone without work may result in no credit given. A CALCULATOR is NOT to be used while working on this packet. The problems in this packet are designed to help you review topics that are important to your success in Calculus.

We will review these topics for the first few days of school. There will be an examination covering these topics.

Factoring

Factor the following completely.

1. $3x^2 - 12$

6. $x^2 - a^2$

2. $x^3 - 8$

7. $3x^2 - 11x + 6$

3. $2x^3 - 8x^2 + 6x$

8. $x^3 + 3x^2 - 25x - 75$

4. $x^2 + 2x + 2$

9. $3x^3 - 12xc^4$

5. $x^4 - 16$

Factor the numerator and denominator and simplify. Identify any discontinuities.

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

4. $\frac{x^2 - a^2}{x^4 - a^4}$

2. $\frac{x^2 - 4x + 4}{x^2 - 4}$

5. $\frac{x^2 - b^2}{x^3 - b^3}$

3. $\frac{x^3 + 8}{x^2 - 4x - 12}$

6. $\frac{x^3 - 14x^2 + 40x}{x^3 - 4x^2 - 100x + 400}$

I. Simplify.

1. $\frac{x - 4}{x^2 - 3x - 4}$

2. $\frac{x^3 - 8}{x - 2}$

3. $\frac{5 - x}{x^2 - 25}$

4. $\frac{x^2 - 4x - 32}{x^2 - 16}$

Intercepts

Find the x and y-intercepts for each of the following:

a) $y = x^2 + x - 1$

b) $y = (x - 1)\sqrt{9 - x^2}$

c) $y = \frac{x^2 + 3x}{(3x + 1)^2}$

d) $x^2y - x^2 + 4y = 0$

Points of intersection

Find all points of intersection of each of the following:

a) $2x - 3y = 13$ and $5x + 3y = 1$

b) $x^2 + y^2 = 25$ and $2x + y = 10$

c) $y = x^3 - 4x$ and $y = -x$

d) $y = x^4 - 2x^2 + 1$ and $y = 1 - x^2$

Piecewise Functions

1. If $f(x) = \begin{cases} x^3 - 1, & x \leq 1 \\ \cos(\pi x), & x > 1 \end{cases}$, evaluate the following.

a) $f(-1) =$

b) $f(1) =$

c) $f(3) =$

2. If $g(x) = \begin{cases} 3x + 1, & x < 2 \\ x^2 - 4, & x \geq 2 \end{cases}$, evaluate the following.

a) $g(0) =$

b) $g(2) =$

c) $g(4) =$

Function Families

Graphing Parent Functions (No Calculator)

- A. Graph each of the following functions.
- B. Determine the domain and range for each of the following functions.
- C. Determine if each of the following functions are even, odd, or neither graphically.
- D. Determine the end behavior of the functions #1-5.

- | | | | | | |
|-----|----------------------|-----|----------------------|-----|------------------------|
| 1. | $f(x) = x^2$ | 2. | $f(x) = \frac{1}{x}$ | 3. | $f(x) = \frac{1}{x^2}$ |
| 4. | $f(x) = e^x$ | 5. | $f(x) = x^3$ | 6. | $f(x) = \sqrt{x}$ |
| 7. | $f(x) = \sqrt[3]{x}$ | 8. | $f(x) = k$ | 9. | $f(x) = x$ |
| 10. | $f(x) = \ln x$ | 11. | $f(x) = x $ | 12. | $f(x) = e^{-x}$ |

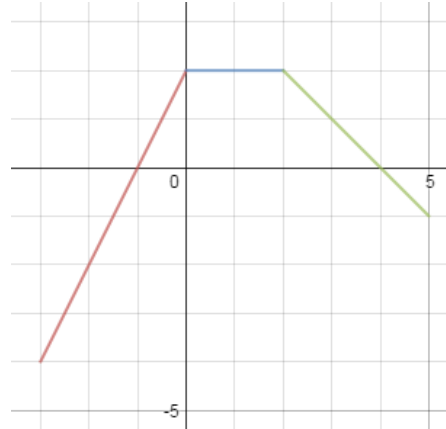
Graphing Transformations of Functions (No Calculator)

- A. Graph each of the following functions.
- B. Identify the increasing and decreasing intervals of the functions in #13-16.

- | | | | |
|-----|----------------------------|-----|------------------------------|
| 13. | $y = 2 + \frac{1}{2}(x+1)$ | 14. | $y = \frac{1}{2}(x+2)^2 - 4$ |
| 15. | $y = x(x-3)(x+2)$ | 16. | $y = 3-x + 2$ |
| 17. | $y = -2^x - 1$ | 18. | $y = \frac{1}{x-2}$ |
| 19. | $y = 1 + \frac{1}{x^2}$ | 20. | $y = -\ln(x+2)$ |

$$21. \quad y = \begin{cases} 4 - x^2, & x < 1 \\ \sqrt{x}, & 1 \leq x \leq 4 \\ 2x - 4, & x > 4 \end{cases}$$

22. Write the piece-wise function for the following graph.



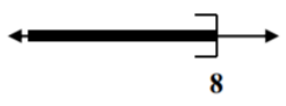
Slopes

Write the equation of the line with the following characteristics

- passes through (3, -4) and (5, 2)
- is a horizontal line with a y-intercept at -4
- is a vertical line that passes through (7, -8)
- has an x-intercept at 5 and a y-intercept at -3
- is parallel to the line $3x + 4y = 7$, passes through the point (-6, 4) and is written in point-slope form
- is perpendicular to the line $5x - 3y = 0$, passes through the point $(\frac{3}{4}, \frac{7}{8})$ and is written in point-slope form

Interval Notation

26. Complete the table with the appropriate notation or graph.

Solution	Interval Notation	Graph
$-2 < x \leq 4$		
	$[-1, 7)$	
		

Solve each equation. State your answer in BOTH interval notation and graphically.

27. $2x - 1 \geq 1$

28. $-4 \leq 2x - 3 < 4$

29. $\frac{x}{2} - \frac{x}{3} > 5$

VII. Expand and simplify.

1. $\sum_{n=0}^4 \frac{n^2}{2}$

2. $\sum_{n=1}^3 \frac{1}{n^3}$

VIII. Simplify.

1. $\frac{\sqrt{x}}{x}$

2. $e^{\ln 3}$

3. $e^{(1+\ln x)}$

4. $\ln 1$

5. $\ln e^7$

6. $\log_3\left(\frac{1}{3}\right)$

7. $\log_{1/2} 8$

8. $\ln \frac{1}{2}$

9. $e^{3 \ln x}$

10. $\frac{4xy^{-2}}{12x^{-1/3}y^{-5}}$

11. $27^{2/3}$

12. $(5a^{2/3})(4a^{3/2})$

13. $(4a^{5/3})^{3/2}$

14. $\frac{3(n+1)!}{5n!}$

Evaluate

Evaluate the following trigonometric expressions.

a) $\csc \frac{5\pi}{4}$

b) $\cot \frac{-\pi}{6}$

c) $\sec \frac{8\pi}{3}$

d) $\sin \frac{3\pi}{2}$

e) $\cos \frac{\pi}{2}$

f) $\tan \pi$

g) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

h) $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

i) $\sin\left(\cos^{-1}\left(\frac{7}{11}\right)\right)$

Solving Trig Equations (No Calculator)

Solve the following trig equations on the interval $[-2\pi, 2\pi]$.

a) $2 \cos x + 1 = 0$

b) $\csc x = -\sqrt{2}$

c) $\sin x (\sin x + 1) = 0$

d) $3 \sec^2 x - 4 = 0$