

Part 1: Textbook

You must have a copy of the textbook for this class to show the instructor on the first day, or you will be dropped from the class. The textbook is the following. Get this exact edition, not an older edition. Textbooks like this come out with a new edition whenever the AP test changes, so in order to prepare for the current design of the AP test, you need to use the current edition.

M. Sullivan and K. Miranda, *Calculus for the AP Course*, 3rd edition. Bedford, Freeman, and Worth (2020). ISBN 978-1-31-924431-6. \$125.

Part 2: Demonstration of Precalculus Knowledge

Do these problems on separate paper. Copy down the problem and then show all your work.

For questions 1-8, do the following:

- What type of function or relation is it?
- Give the domain and range for any case where the answer is not “all real numbers.”
- Give equations of any asymptote lines.
- Give the coordinates of any point that is a maximum or minimum.
- If it is a function, give the equation of the inverse function.
- Graph (not sketch) the equation on graph paper, showing coordinates of points and labeling all important features.

1. $f(x) = 3x^4 + 5x^3 - 17x^2 - 13x + 6$

2. $f(x) = \sqrt[3]{x}$

3. $f(x) = e^{-2x+1}$

4. $f(x) = \log_5(x - 2)$

5. $f(x) = \frac{x^3 - x^2 + 4x - 6}{x^2 - 2x - 15}$ Don't bother with the inverse on this one. Get all asymptotes.

6. $f(x) = 2\cos(2x - \pi) - 1$ Identify period, frequency, amplitude, phase shift, and offset.

7. $\frac{(y+1)^2}{9} - \frac{(x-2)^2}{16} = 1$

8. $x = 3 \cos t$ and $y = 4 \sin t$. Show arrows on your graph to indicate where the curve goes from $t=0$ to 2π .

9. Give the values of the trigonometric functions of the angle $5\pi/3$. Get the signs correct and keep square roots in the numerators of fractions. Give answers as fractions with square roots, not decimals.

$$\sin 5\pi/3$$

$$\cos 5\pi/3$$

$$\tan 5\pi/3$$

$$\sec 5\pi/3$$

$$\csc 5\pi/3$$

$$\cot 5\pi/3$$

10. Give a rational expression for $\tan(\sin^{-1} x)$.

11. Using the binomial theorem, write out the expanded form of $(2x - 3)^5$.

For questions 12-15, solve for x .

12. $2x^3 + 3x^2 - 11x + 6 = 0$

13. $4^{2x-1} = 8^{x+3}$

14. $\log_3(4x - 7) = 2$

15. $\sin(2x) = \frac{1}{2}$, all answers from 0 to 2π .

For questions 16-18, give both the recursive and explicit definitions for the series, and evaluate the sum to the number of terms indicated. Use sigma notation.

16. $11 + 8 + 5 + 2 + \dots$ through 12 terms

17. $1 + 2 + 4 + 8 + 16 + \dots$ through 10 terms

18. $-3 + \frac{3}{2} - \frac{3}{4} + \frac{3}{8} - \dots$ through infinitely many terms