

Dear AP Calculus AB Student,

1. Attached please find an AP Calculus Review Packet. The Review consists of 3 major areas: Algebra Functions Trigonometry
2. Please complete this summer. I suggest you set aside at least 3 hours per week to review thoroughly. (use your notes from Honors Precalculus)
3. Please take some time during your last week of vacation to correct your summer packet & see if you have any questions.
4. On 1st day of class we will clear up any areas of difficulty on summer packet. On 2nd day of class you'll have a quiz on material.

Part 1 Algebra

A. Simplify the following expressions. Assume the variables represent positive real numbers and no denominator equal zero.

1. $\left(\frac{2r^3}{s}\right)^2 \left(\frac{s}{r^3}\right)^3$

2. $(u^{-2}v^{-3})^2$

3. $\frac{8x^3y^{-5}}{4x^{-1}y^2}$

4. $\sqrt[3]{16x^3y^8z^4}$

5. $\sqrt[5]{\frac{x}{y^2}}$

6. $(-27)^{\frac{2}{3}}(4)^{\frac{-5}{2}}$

7. $\frac{x^2-4}{x^2+9x+20} \div \frac{x^2+5x+6}{x^2+4x-5} \cdot \frac{x^2+3x-4}{(x-1)^2}$

8. $3 + \frac{5}{u} + \frac{u}{3u+1}$

9. $\frac{y^{-1} + x^{-1}}{(xy)^{-1}}$

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

11. $\frac{1}{\sqrt{x+h} + \sqrt{x}}$

12. $\frac{8x^3 + 27y^3}{4x^2 - 9y^2}$

B. Solve the following equations.

13. $2x - \frac{3(x-2)}{2} = 7 - \frac{x-3}{3}$

14. $|2x-1| = |3x+4|$

15. $6x^2 + 7 = -23x$

16. $5\sqrt{x+2} = x+8$

17. $3x^2 + 4x - 1 = 0$

18. $x - 9x^{\frac{1}{2}} + 8 = 0$

$$19. \frac{3x}{x-2} = 1 + \frac{6}{x-2}$$

$$20. \text{ Solve for } R_1. \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

Dividing Polynomials: Long Division and Synthetic Division

Divide:

$$1. \quad 12x^4 + 24x^3 - 36x^2 \text{ by } 6x^2$$

$$2. \quad \frac{16x^2y^4 + 24xy^3 - 8x^2y^2}{8x^3y^3}$$

$$3. \quad 15x^6 - 25x^4 + 30x^2 \text{ by } 15x^2$$

$$4. \quad x^2 + 16x + 15 \div x + 15$$

$$5. \quad 6x^2 - 13x - 5 \div 2x - 5$$

$$6. \quad 3x^3 - x^3 + 4x^2 - 12x - 8 \div x^2 - 2$$

$$7. \quad 2x^3 + x^2 - 35x + 40 \div x + 5$$

Use synthetic division to divide:

$$8. \quad x^2 + 7x + 6 \div x + 6$$

$$9. \quad \frac{x^3 - 7x^2 - 13x + 5}{x - 2}$$

$$10. \quad \frac{x^3 + 27}{x + 3}$$

C. Lines, Parabolas, and their equations

26. Answer the following for the line that passes through $A(3, -2)$ & $B(6, -6)$.

a. Determine the slope of \overline{AB} .

b. Determine the coordinates of the midpoint of \overline{AB} .

c. Determine the length of \overline{AB} .

d. Use the point-slope form of a line to write an equation to represent \overline{AB} .

e. Express your answer in part (d) in $y = mx + b$ form.

f. State the x and y intercepts of the graph.

g. Put the equation in general form with A being a positive integer $Ax + By = C$.

h. Write an equation for the perpendicular bisector of \overline{AB} .

27. Answer the following for the parabola with equation $y = 2x^2 + 8x + 3$.

a. Does the parabola open upwards or downwards?

b. What is the y intercept of the graph?

c. State the x intercepts in both exact form and decimal approximations(3 decimal places.)

d. Put the equation into standard form. $\left[y = a(x-h)^2 + k \right]$

e. State the coordinates of the vertex.

f. Sketch the graph.

Part 2 Functions

A. For each of the functions complete the following: a. State the domain and range, b. Give the coordinates of x and y intercepts. c. State the intervals on which the function is increasing/decreasing/constant, d. State if the function is even or odd or neither, and e. Sketch the graph.

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

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

3. $f(x) = \sqrt{4-x^2}$

4. $f(x) = \sqrt{x^2-4}$

5. $f(x) = -\frac{1}{2}\sin x$

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

7. $f(x) = \log_2(x+1)$

8. $f(x) = -e^x$

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

10. $f(x) = (x-1)^2(x+3)$

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

12. $f(x) = \begin{cases} -2, & x < 0 \\ 2x+1, & x \geq 0 \end{cases}$

B. For each of the following functions simplify: a. $\frac{f(x+h)-f(x)}{h}$ b. $\frac{f(x)-f(a)}{x-a}$

1. $f(x) = x + 3$

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

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

4. $f(x) = \sqrt{x+2}$ (rationalize numerator)

C. Find $f^{-1}(x)$ for each function.

1. $f(x) = 3x - 4$

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

3. $f(x) = \frac{x-3}{x+1}$

4. $f(x) = e^{x+1}$

Part 3 Trigonometry

A. Exact trig values. Evaluate (if defined) w/out calculator.

1. $\sin \frac{\pi}{3}$

2. $\cos \frac{3\pi}{4}$

3. $\tan \frac{5\pi}{6}$

4. $\csc \frac{11\pi}{6}$

5. $\sec \left(\frac{-3\pi}{4} \right)$

6. $\cot \pi$

7. $\cos \frac{4\pi}{3}$

8. $\csc \frac{3\pi}{2}$

9. $\tan \left(\frac{-7\pi}{3} \right)$

10. $\sin \frac{7\pi}{4}$

11. $\sec \frac{3\pi}{2}$

12. $\cot \frac{5\pi}{4}$

B. Graphs. Graph each pair on same coordinate plane.

1. a. $y = \sin x$

b. $y = -2 \sin x$

2. a. $y = \cos x$

b. $y = \cos 2x$

3. a. $y = \tan x$

b. $y = \tan \left(x + \frac{\pi}{2} \right)$

4. a. $y = \csc x$

b. $y = \csc x + 1$

5. a. $y = \sec x$

b. $y = -\sec \left(x - \frac{\pi}{2} \right)$

6. a. $y = \cot x$

b. $y = \cot \frac{1}{2}x$

C. Identities

1. What are the reciprocal identities?
2. What are the tangent and cotangent identities?
3. What are the Pythagorean identities?

D. Equations/Inequalities. Solve the following on $[-2\pi, 2\pi]$.

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

2. $\cot^2 x - 3 = 0$

3. $\sin x > \frac{1}{2}$

4. $\cos x \leq \frac{-\sqrt{3}}{2}$

E. Formulas. Rewrite expression using appropriate formula.

1. $\sin(x + y)$

2. $\cos(\alpha - \beta)$

3. $\tan(u + v)$

4. $\sin 2\theta$

5. $\cos 2\theta$

6. $\tan 2\theta$

7. $\sin\left(x - \frac{\pi}{4}\right)$

8. $\cos\left(x + \frac{\pi}{2}\right)$

9. $\tan\left(x - \frac{\pi}{4}\right)$











