



## AP Calculus AB Summer Assignment

NAME:

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### Are you ready for Calculus?

Instructions: To prepare for AP Calculus, please complete all parts of the following problems. Show all work neatly on a separate pieces of paper and indicate your answers clearly. This assignment will be collected at the beginning of your AP Calculus class and will count as your first quiz grade. Additionally, you will be assessed on this material within the first week of class which will count as your second quiz grade.

Use this summer assignment as an opportunity to review any algebra, geometry, or precalculus topics that may have faded from your memory or for which you need more practice. Your understanding of this prerequisite material is essential for success in AP Calculus AB.

Good luck and have a great summer!

1. Simplify (a)  $\frac{x^3-9x}{x^2-7x+12}$  (b)  $\frac{x^2-2x-8}{x^3+x^2-2x}$  (c)  $\frac{\frac{1}{x}-\frac{1}{5}}{\frac{1}{x^2}-\frac{1}{25}}$

2. Rationalize the denominator (a)  $\frac{2}{\sqrt{3}+\sqrt{2}}$  (b)  $\frac{4}{1-\sqrt{5}}$

3. Solve for x without a calculator

(a)  $5^{(x+1)} = 25$  (b)  $\frac{1}{3} = 3^{2x+2}$  (c)  $\log_3 x^2 = 2 \log_3 4 - 4 \log_3 5$

4. Simplify  $\log_{10} 10^{\frac{1}{2}}$

5. Solve for the indicated variables:

(a)  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ , for a (b)  $A = 2\pi r^2 + 2\pi rh$ , for  $r > 0$  (c)  $A = P + nrP$ , for P

6. For the equations given complete the square and reduce to one of the standard forms  $y - b = A(x - a)^2$  or  $x - a = A(y - b)^2$

(a)  $3x^2 + 3x + 2y = 0$  (b)  $9y^2 - 6y - 9 - x = 0$

7. Factor completely: (a)  $8x^3 + 27$  (b)  $x^4 - 1$

8. Find all real solutions: (a)  $x^6 - 16x^4 = 0$  (b)  $8x^3 - 27 = 0$

9. Solve for x, (a)  $3\sin^2 x = \cos^2 x$ ,  $0 \leq x < 2\pi$  (b)  $\cos^2 x - \sin^2 x = \sin x$ ,  $-\pi < x \leq \pi$

10. Without a calculator, evaluate (a)  $\cos 210^\circ$  (b)  $\sin \frac{5\pi}{4}$  (c)  $\tan^{-1}(-1)$  (d)  $\sec^{-1}(1)$

11. Solve the equations: (a)  $4x^2 + 12x + 3 = 0$  (b)  $2x + 1 = \frac{5}{x+2}$  (c)  $\frac{x+1}{x} - \frac{x}{x+1} = 0$

12. Solve the inequalities: (a)  $x^2 + 2x - 3 \leq 0$  (b)  $x^2 + x + 1 > 0$

13. Solve for x: (a)  $|-x + 4| \leq 1$  (b)  $|2x + 1| = x + 3$

14. Determine the equations of the following lines: (a) through  $(-1, 3)$  and  $(2, -4)$

(b) through  $(-1, 2)$  and perpendicular to  $2x - 3y + 5 = 0$

(c) through  $(2, 3)$  and the midpoint of the line segment from  $(-1, 4)$  to  $(3, 2)$

15. Shade the region in the xy-plane described by  $3x - y < 7$  and  $x + 5y + 3 \geq 0$

16. Find the equation of a circle with its center at  $(1, 2)$  passing through  $(-2, -1)$

17. Find the center and radius of the circle  $x^2 + y^2 + 6x - 4y + 3 = 0$

18. Find the domain of  $f(x) = \frac{3x+1}{\sqrt{x^2+x-2}}$

19. Find the domain and range of  $\frac{5x-3}{2x+1}$

20. Simplify  $\frac{f(x+h)-f(x)}{h}$  where (a)  $f(x) = 2x + 3$ , (b)  $f(x) = \frac{1}{x+1}$  (c)  $f(x) = x^2$

21. Sketch the graphs of (a)  $g(x) = |3x + 2|$  (b)  $h(x) = |x(x-1)|$

22. Find the inverse of the function (a)  $f(x) = 2x + 3$  (b)  $f(x) = \frac{x+2}{5x-1}$

23. Express  $x$  in terms of the other variables in the picture

