Name _____

Papillion La-Vista South High School
Practice Set of Required Math Skills for
AP Calculus AB

Students should practice each of the following skills to prepare for AP Calculus AB. This material represents an expectation of skills and concepts for calculus students. Attach all work if using separate sheets of paper.

Factoring:

Factor each expression compltely.

1. $x^3 + 8$

2. $x^3 - 8$

3. $x^2 + 11x - 80$

4. $ac + cd - ab - bd$

5. $2x^2 + 50y^2 - 20xy$

6. $(x-3)^2(2x+1)^3 + (x-3)^3(2x+1)^2$

7. $6x^5 - 51x^3 - 27x$

8. $3x^3 - 2x^2 - 12x + 8$

Simplifying Expressions:

Simplify each expression. Write answers with positive exponents where applicable.

9. $\left(4a^{5/3}\right)^{3/2}$

10. $\dfrac{\dfrac{2}{x^2}}{\dfrac{10}{x^3}}$

11. $\dfrac{\dfrac{1}{2} - \dfrac{5}{4}}{\dfrac{3}{8}}$

12. $\dfrac{12x^{-3}y^2}{18xy^{-1}}$

13. $\dfrac{5-x}{x^2-25}$

14. $\dfrac{15x^2}{5\sqrt{x}}$

15. $\dfrac{\dfrac{25}{a} - a}{5+a}$

16. $\dfrac{2 - \dfrac{4}{x+2}}{5 + \dfrac{10}{x+2}}$

17. $\dfrac{\dfrac{4}{x^2-9} + \dfrac{2}{x-3}}{\dfrac{1}{x+3} + \dfrac{1}{x-3}}$

18. $\dfrac{36}{\dfrac{1}{x} + \dfrac{7}{2x}}$

Rational Equations:

Solve each rational equation.

19. $\dfrac{2}{3} - \dfrac{5}{6} = \dfrac{1}{x}$

20. $\dfrac{x-5}{x+1} = \dfrac{3}{5}$

21. $\dfrac{2}{x+5} + \dfrac{1}{x-5} = \dfrac{16}{x^2-25}$

22. $\dfrac{x}{2x-6} - \dfrac{3}{x^2-6x+9} = \dfrac{x-2}{3x-9}$

Functions:

Evaluate each functions at the given values.

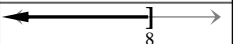Let $f(x) = 2x + 1$ and $g(x) = 2x^2 - 1$

23. $f(2) =$

24. $g(-3) =$

25. $f(t+1) =$

26. $f(g(-2)) =$

27. $g(f(m+2)) =$

28. $\dfrac{f(x+h) - f(x)}{h}$

Let $f(x) = x^2$, $g(x) = 2x + 5$ and $h(x) = x^2 - 1$

29. $f(g(x-1)) =$

30. $\dfrac{f(x+h) - f(x)}{h}$

Interval Notation:

31. Complete the table.

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

Domain and Range:

Find the domain and range of the function.

32. $f(x) = x^2 - 5$

33. $f(x) = -\sqrt{x+3}$

34. $f(x) = 3\sin x$

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

Inverses:

Find the inverse of the function.

36. $f(x) = 2x + 1$ 　　　37. $f(x) = \dfrac{x^2}{3}$

38. What it the relationship of inverses numerically, graphically, and algebrically?

39. Prove that f and g are inverses of each other.

$f(x) = 9 - x^2,\ x \ge 0$ 　　　$g(x) = \sqrt{9 - x}$

Equations of Lines:

Slope Intercept Form: $y = mx + b$

Point-Slope Form: $y - y_1 = m(x - x_1)$

Write the equation of a line with the given attributes.

40. Slope is undefined and passes through (5, -3)

41. Slope is zero and passes through (-4, 2)

42. Passes through (2, 8) and parallel to $y = \frac{5}{6}x - 1$.

43. Passes through (4, 7) and perpendicular to y-axis.

44. Passes through (-3, 6) and (1, 2)

45. Has x-intercept of (2, 0) and y-intercept of (0, 3).

Logarithms:

Complete the following properties for logarithms:

46. $\log_b 1 =$ 　　47. $\log_b b =$ 　　48. $\log_b b^x =$

49. $\log_b uv =$ 　　50. $\log_b \dfrac{u}{v} =$ 　　51. $\log_b u^n =$

Evaluate without a calculator.

52. $\log_4 64$ 　　　　　　　　　　53. $\log_8 \dfrac{1}{2}$

54. $\ln e^8$ 　　　　　　　　　　　55. $\log_{1/3} 27$

Solve.

56. $12 = 10^{x+5} - 7$ 　　　　　　57. $5 - \ln x = 7$

58. $3e^{-x} - 4 = 9$ 　　　　　　　59. $5\log_3(x - 2) = 10$

Trigonometry

Fill out the unit circle, and evaluate each trigonometric function exactly without a calculator.

60. $\sin \pi$ 　　61. $\cos \dfrac{5\pi}{4}$ 　　62. $\sin\left(-\dfrac{\pi}{2}\right)$

63. $\sin \dfrac{11\pi}{6}$ 　　64. $\tan \dfrac{2\pi}{3}$ 　　65. $\sec \dfrac{7\pi}{6}$

66. $\tan \dfrac{\pi}{2}$ 　　67. $\csc \dfrac{\pi}{3}$