

Calculus I Summer Algebra Readiness Packet

Full Name (Please Print): _____

Instructions:

No Calculators. Choose the best answer for each question. Show your work on a separate sheet of paper. Write the corresponding formula(s) you use. Do not plug in the multiple choices to determine the solutions. A strong foundation in these topics will eliminate most of the mistakes done in Calculus I.

Part A: Factoring and Algebra

1. Factor $x^2 - 9x + 20$ A. $(x-4)(x-5)$ B. $(x+4)(x+5)$ C. $(x-10)(x+2)$ D. Prime	2. Factor $4x^2 - 25$ A. $(2x-5)^2$ B. $(2x+5)^2$ C. $(2x-5)(2x+5)$ D. $(x-5)(x+5)$
3. Factor $x^3 - 8$ A. $(x-2)(x^2 + 2x + 4)$ B. $(x-2)(x^2 - 2x + 4)$ C. $(x+2)(x^2 - 2x + 4)$ D. Prime	4. Simplify $(x^2 - 16)/(x^2 - 4x)$ A. $(x+4)/x$ B. $(x-4)/x$ C. $x/(x+4)$ D. 1
5. Factor $x^2 + 7x + 10$ A. $(x+5)(x+2)$ B. $(x+10)(x-1)$ C. $(x+5)^2$ D. Prime	6. Factor $9x^2 - 49$ A. $(3x-7)(3x+7)$ B. $(9x-7)(x+7)$ C. $(3x-7)^2$ D. Prime
7. Simplify $x^3 \cdot x^5$ A. x^8 B. x^{15} C. x^2 D. x^7	8. Simplify $(x^4)/(x^2)$ A. x^2 B. x^8 C. $2x$ D. x
9. Rewrite x^{-3} A. $1/x^3$ B. x^3 C. $-x^3$ D. $3/x$	10. Simplify $(2x^2y)(3xy^2)$ A. $6x^3y^3$ B. $5x^3y^3$ C. $6x^2y^2$ D. $6xy$



Part B: Rational Expressions and Equations

11. Solve $\frac{2}{x-1} = \frac{5}{x+2}$ A. 4 B. 3 C. 8 D. -4	12. Solve $\frac{x+1}{x-2}=3$ A. 2 B. 7/2 C. 5/2 D. -2
13. Simplify $\frac{(x^2+5x+6)}{(x^2+7x+12)}$ A. $(x+2)/(x+3)$ B. $(x+3)/(x+4)$ C. $(x+2)/(x+4)$ D. 1	14. Simplify $\frac{x^{-2}y^3}{x^4y^{-1}}$ A. y^4/x^6 B. y^2/x^6 C. x^6/y^4 D. x^2y^2
15. Solve $x^2-5x-14=0$ A. {7,-2} B. {14,-1} C. {2,-7} D. {5,-14}	16. Solve $2x^2+3x-4=0$ A. $(-3\pm\sqrt{41})/4$ B. $(3\pm\sqrt{41})/4$ C. $(-3\pm5)/4$ D. None
17. Solve $x^4-16=0$ (real roots only) A. ± 2 B. ± 4 C. 4 D. -4	18. Solve $x^2-9>0$ A. (-3,3) B. $(-\infty,-3)\cup(3,\infty)$ C. [-3,3] D. all reals
19. Solve $\frac{x-3}{x+2}\leq 0$ A. (-2,3] B. [-2,3] C. $(-\infty,-2)\cup(3,\infty)$ D. (-2,3)	20. Solve $ x-2 =5$ A. 7,-3 B. 3,-7 C. ± 5 D. 2,5



Part C: Functions

21. Find $f(-2)$ for $f(x)=3x^2-2x+1$ A. 9 B. 13 C. 17 D. 21	22. Domain of $\frac{1}{x^2-16}$ A. $x \neq \pm 4$ B. $x \neq 4$ C. $x > 4$ D. all reals
23. Domain of $\sqrt{5-x}$ A. $x \geq 5$ B. $x \leq 5$ C. all reals D. $x < 5$	24. If $f(x)=2x+3$, $g(x)=x^2$, find $f(g(x))$ A. $2x^2+3$ B. $(2x+3)^2$ C. $2x^2$ D. x^2+3
25. Inverse of $\frac{x-1}{2}$ A. $2x+1$ B. $(x+1)/2$ C. $2x-1$ D. same	26. Evaluate $g(3)$ if $g(x)=x^2-4$ A. 5 B. 9 C. 13 D. -1
27. Domain of $\sqrt{x+2}$ A. $x \geq -2$ B. $x \leq -2$ C. all reals D. $x > -2$	28. Range of $y=x^2$ A. $y \geq 0$ B. all reals C. $y \leq 0$ D. $y > 0$
29. Find $f(0)$ if $f(x)=5-x$ A. 5 B. 0 C. -5 D. 1	30. Compose $g(f(x))$ for $f=x+1, g=x^2$ A. $(x+1)^2$ B. x^2+1 C. x^2 D. $2x+1$



Part D: Graphs and Geometry

31. Transform $y=x^2$ to $y=-(x-3)^2+2$ A. right 3 up 2 reflect x-axis B. left 3 up 2 C. right 2 up 3 D. reflect y-axis	32. Vertex of $(x+4)^2-7$ A. (4,-7) B. (-4,-7) C. (-4,7) D. (4,7)
33. x-intercepts of x^2-4x-5 A. -1 and 5 B. 1 and 5 C. -5 and 1 D. none	34. Slope through (2,-1),(6,7) A. 1 B. 2 C. 3 D. 4
35. Line slope 3 through (2,5) A. $y=3x+5$ B. $y=3x-1$ C. $y=3x+1$ D. $y=x+3$	36. Slope-intercept form of line with slope -2 and y-int 4 A. $y=-2x+4$ B. $y=2x+4$ C. $y=-2x-4$ D. $y=4x-2$
37. Distance between (0,0) and (3,4) A. 5 B. 7 C. 4 D. 3	38. Midpoint of (2,6),(4,10) A. (3,8) B. (2,8) C. (3,10) D. (4,8)
39. y-intercept of $y=2x-7$ A. -7 B. 2 C. 7 D. 0	40. Parabola $y=x^2$ opens A. up B. down C. left D. right

Part E: Exponential, Logarithmic, and Trigonometry

41. Solve $2^x = 16$ A.2 B.3 C.4 D.8	42. Solve $\ln(x)=2$ A. e^2 B. $2e$ C. $\ln 2$ D. e
43. $\log(1000)$ A.1 B.2 C.3 D.10	44. $\sin(\pi/6)$ A.0 B. $1/2$ C. $\sqrt{2}/2$ D. $\sqrt{3}/2$
45. Angle for $(\sqrt{3}/2, 1/2)$ A. $\pi/6$ B. $\pi/4$ C. $\pi/3$ D. $\pi/2$	46. $\cos(\pi/3)$ A. $1/2$ B. $\sqrt{2}/2$ C. $\sqrt{3}/2$ D.1
47. $\tan(\pi/4)$ A.0 B.1 C. $\sqrt{3}$ D. $1/2$	48. Solve $10^x=100$ A.1 B.2 C.10 D.100
49. $\ln(e^5)$ A.1 B.5 C.e D.0	50. $\sin^2 3\theta + \cos^2 3\theta =$ A.0 B.1 C.2 D. $3 \sin \theta$



Part F: General Theorems

State if each statement is True or False. If False give a numerical counterexample. All expressions are well defined.

Here is an example:

$x \leq x^2$. False: because $(1/2) \geq (1/2)^2$

51. $|a + b| = |a| + |b|$

52. $\sqrt{a + b} = \sqrt{a} + \sqrt{b}$

53. $\frac{a}{a+b} = \frac{1}{1+b}$

54. $\frac{a+b}{a} = 1 + b$

55. $\frac{a+ab}{a} = 1 + b$

56. $\frac{a}{a+b} - \frac{1}{1+\frac{b}{a}} = 0$

57. $\frac{\sqrt{a+b}}{a+b} = \frac{1}{\sqrt{a+b}}$

58. $\frac{\frac{x}{2-y}}{2-y} = x$

59. $\frac{\frac{x}{a}}{\frac{a}{x}} = 1$

60. $\frac{\frac{x}{a}}{x} = \frac{1}{a}$