AP Calculus   Name _____

<div align="center">Precalculus Review</div>

Domain
Find the domain and range of the following functions. Write your answers in interval notation.
Hint: Use what you know about the functions and then verify your thoughts with the calculator.

1. $f(x) = x^3 + 3x^2 + 1$ 2. $f(x) = \dfrac{x+2}{x^2-4}$ 3. $f(x) = \sqrt{9-x^2}$

Computations
4. For $f(x) = x^2 - 2x + 1$, find

a) f(3)   b) f(a+1)   c) f(x+h)

5. If $f(x) = 3x - 5$ and g(x) = x^2 + 2, find

a) $[f \circ g](x)$ b) $[g \circ f](x)$
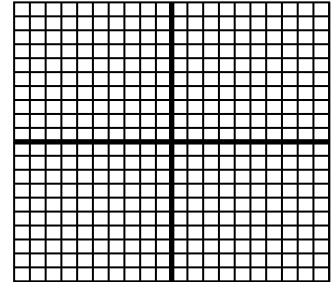
Linear and Quadratic Functions
6. Find the equation of the line passing through the points (2,3) and (-5,7). Express your answer in the form
$y - y_1 = m(x - x_1)$.

7. Find the equation of the line that passes through the point (-2, 3) and is parallel to the line
3x – 2y + 6 = 0.

8. Find the equation of the line that passes through the point (-1, 2) and is perpendicular to the line
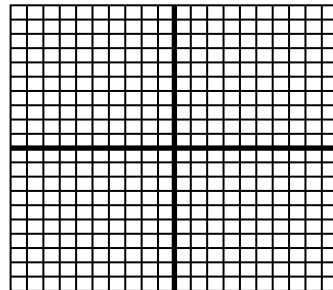 2x – 3y + 5 = 0.

9. Find the point of intersection of the lines 3x – y – 7 = 0 and x + 5y + 3 = 0.

10. Sketch the region bounded by the curves y = 9 – x^2 and y = 2x + 1.
(bounded means enclosed by)

Piece-Wise Defined Functions

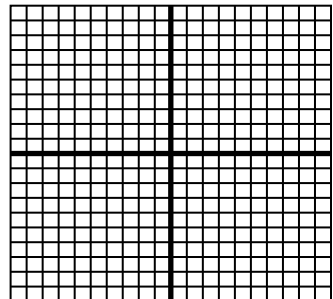11. Sketch the graph of $f(x) = \begin{cases} 2x+1 & \text{if } x < -1 \\ 7 & \text{if } x = -1 \\ 9-x^2 & \text{if } x > -1 \end{cases}$

12. Sketch the graph of $f(x) = \begin{cases} x+2 & \text{if } x<1 \\ x^2 & \text{if } x\geq 1 \end{cases}$

Factoring
Factor the following expressions completely.

13. $x^2 - 64$ 14. $9x - x^3$ 15. $x^2 + 2x - 3$

16. $6x^2 - x - 2$ 17. $x^2 - 3x - 88$ 18. $2x^3 - 3x^2 - 6x + 9$

Simplifying Rational Expressions

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

20. $\dfrac{x^2 - 2x - 8}{x^3 + x^2 - 2x}$

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

Solving Equations
22. $4x - 11 = 3x + 1$

23. $(2x - 1)(4x - 3) = (8x - 1)(x + 2)$

24. $(x - 2)^2 = 16$

25. $(x + 1)^3 = -8$

26. $\dfrac{x+3}{5} = \dfrac{2-x}{7}$

27. $\dfrac{2x+5}{x+1} = \dfrac{3}{4}$

Exponents Simplify. All exponents must be positive.

28. $x^2(x^4)$

29. $(x^2)^4$

30. $x^{2/3}$
(RADICAL FORM)

31. $\dfrac{(x^3 y^{-2})^4}{x^2 y^5}$

Logarithms Simplify.
32.. $\log_2 8$

33. $\ln e^3$

34. $\ln 4 + \ln 5$

35. $\log 10 - \log 5$

Trigonometry Review

36. If $\sin\theta = \dfrac{4}{5}$, and $0 < \theta < \dfrac{\pi}{2}$, find (Hint: Draw a triangle.)

a) $\cos\theta$ b) $\tan\theta$ c) $\sec\theta$ d) $\csc\theta$ e) $\cot\theta$

Find the **exact** value of each expression. (No calculators)

37. $\sin\dfrac{\pi}{6}$

38. $\cos\dfrac{\pi}{4}$

39. $\tan\dfrac{7\pi}{6}$

40. $\csc\left(-\dfrac{5\pi}{6}\right)$

41. $\sec\pi$

42. $\cot\left(-\dfrac{3\pi}{2}\right)$

43. $\sin\left(\dfrac{\pi}{2}\right)$

44. $\cos\dfrac{2\pi}{3}$

45. $\tan\left(\dfrac{5\pi}{4}\right)$

Evaluate the following expressions. Because Arcfunctions are restricted, there will only be one answer.

46. $\cos^{-1}\left(\dfrac{\sqrt{3}}{2}\right)$

47. $\sin^{-1}\left(\dfrac{1}{2}\right)$

48. $\cot^{-1}(-1)$

49. $\tan^{-1}(0)$

50. $\sec^{-1}(-2)$

51. $\sec^{-1}(-1)$

Solve the following equations for x.
52. $2\cos x = 1$ in the interval $[0, 2\pi)$.

53. $2\cos^2 x = 1$ in the interval $[0, 2\pi)$.

54. $\sin^2 x + \sin x = 0$ in the interval $[0, 2\pi)$.

55. $\cot x = 0$ in the interval $[0, \pi]$.

Divide using synthetic or long division (if appropriate)

56. $\dfrac{x^3 - 4x^2 + 2x + 5}{x - 2}$

57. $\dfrac{3x^3 + 4x + 11}{x^2 - 3x + 2}$