

A.P. Calculus: Summer Assignment

All work is expected to be neat and labeled on separate paper. No legible work = no credit. You should NOT use a calculator unless the problem is labeled with an (*) and bold. A good resource for review is the website www.coolmath.com (choose precalc/calc). You can also go to my website: www.kreganmath.weebly.com

This will be collected on Day 1 with a quiz on this material Day 3. This summer assignment is intended for you to do as REVIEW to prepare for the quiz – your first grade in AP Calculus. If you struggle with any of these concepts, you may need to do *additional review on your own as needed* in order to be prepared for both the quiz AND this course.

Solve the following. Express solutions to inequalities in interval notation. **Only use a calculator on the problems labeled with an *.** Any decimals should be rounded to 3 decimal places.

1. $(x+1)(x+2)(x+3) < 0$ 2. $x^4 < 4x^2$ 3. $x^3 > 1$ **4*. $x^3 - 3x + 1 \leq 0$**

5*. $x^4 - 4x \leq -x^2 + 2x$ 6. $\frac{(x-3)(x+2)}{(x-1)} < 0$ 7. $x + \frac{12}{x} < 7$ 8. $\frac{x-4}{2x+4} \geq 1$

9. $\frac{1}{x+2} > \frac{3}{x+1}$ 10. For what positive numbers will the square of a number exceed twice the number?

11. What is the domain of $y = \sqrt{x^3 - 3x^2}$? 12. What is the domain of $y = \sqrt{\frac{x-1}{x+4}}$?

13*. A ball is thrown vertically upward with an initial velocity of 96 ft/s. The distance s (in feet) of the ball from the ground after t seconds is $s(t) = 96t - 16t^2$.

- For what time interval is the ball more than 112 feet above the ground?
- What is the maximum height of the ball?

14. Find $f(g(x))$ and $g(f(x))$ if $f(x) = \frac{x}{3x+2}$ and $g(x) = \frac{2}{x}$. Write answers in simplest form. Include the domain.

15. Find a composite function form for y (in other words, determine $f(x)$ and $g(x)$ so that $y = f(g(x))$):

a. $y = (x^2 + 3x)^{\frac{1}{3}}$ b. $y = \frac{1}{(x^2 + 3x - 5)^3}$

16. **Describe** in words (be specific) what the following would do to a given graph of $f(x)$:

a. $f(x-2)$ b. $f(x+3) - 6$ c. $|f(x)|$ d. $-3f(x)$

Find $f^{-1}(x)$. Pay attention to the given restrictions for #17 and #18.

17. $f(x) = -(x-2)^2, x \leq 2$ 18. $f(x) = x^2 + 2x + 1, x \geq -1$ 19. $f(x) = \frac{2x+1}{x+3}$

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

Determine the domain. Express in interval notation.

21. $y = \frac{\sqrt{x+6}}{x-3}$ 22. $y = \sqrt{x^2 - 7x + 10}$ 23. $y = \log(x^2 - 4)$ 24. $y = e^{3x+4}$

25. $y = 3x^4 - 2x + 1$ 26. $y = \frac{x^2 - 9}{x^2 + x - 12}$

27. Solve for y and simplify where possible: $\ln(y-1) - \ln 2 = x + \ln x$

Solve for x. Leave answers in logarithmic or exponential form if needed but simplified completely:

$$28. 5^{x-2} = 3$$

$$29. \ln x + \ln 3 = 6$$

$$30. \log x + \log(x-6) = \log 16$$

$$31. e^{2\ln x} = 9$$

$$32. \ln e^x = 2.34$$

$$33. 32e^{4x} = 16$$

$$34. x = 3^{\log_3 6 + \log_3 4 - 2\log_3 5}$$

Sketch the following on separate paper (NO CALC):

$$35. f(x) = \begin{cases} 2x & x < -1 \\ x^2 + 2 & -1 \leq x < 1 \\ 3 - x & x \geq 1 \end{cases}$$

$$36. y = (x-2)^3 + 1$$

$$37. y = \sqrt{x+3}$$

$$38. y = \arctan x$$

Factor the following **completely**: (Refer to www.coolmath.com "Freaky factoring")

$$39. 3x^2(x-4)^3 - 2x^3(x-4)^2$$

$$40. (4x-1)^3(x+3)^2 - (4x-1)^2(x+3)$$

Find the exact solutions on the interval $[0, 2\pi)$ unless otherwise stated. Only use a calculator for #43.

$$41. 4 \cos^2 x - 3 = 0$$

$$42. \sin^2 x = \sin x \quad [0, \pi]$$

$$43*. 2\sin 2x = \sqrt{x} \quad [0, \pi]$$

$$44. 1 - 2\sqrt{2} \sin x \cos x = 0$$

$$45. \sin 2x = \sin x \quad x \in \mathfrak{R}$$

$$46. \sin 2x + \cos x = 0 \quad x \in \mathfrak{R}$$

$$47. 2\sin^2 x = 3\sin x - 1$$

$$48. \sin^2 x + 2\cos x = -2$$

$$49. \cos 2x + \sin^2 x = 0$$

$$50. 2\sin^2(x/2) - 3\sin(x/2) + 1 = 0$$

$$51. \cos x = \cot x$$

$$52. \sqrt{3} \csc^2 x + 2\csc x = 0$$

$$53. 2\tan^2 x - 3\sec x = -3$$

Simplify the following completely:

$$54. y = \frac{x-4}{\sqrt{x}-2}$$

$$55. y = \frac{x^5-32}{x-2}$$

$$56. y = \frac{x^3+8}{x^4-16}$$

$$57. y = \frac{x+3}{\frac{1}{x} + \frac{1}{3}}$$

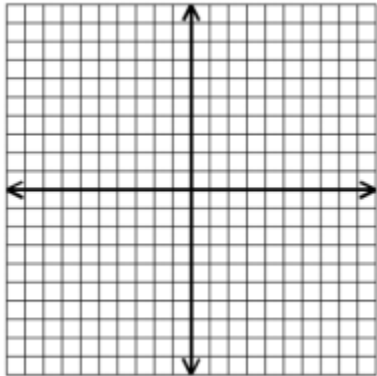
$$58. y = \frac{h}{4 - \sqrt{16+h}}$$

****Must have memorized: Parent graphs and their domain/range/symmetry/end behavior – see next page; UNIT CIRCLE IN RADIANS, graphs of all 6 trig functions and $y = \arctan x$, trig identities (all basic identities, Pythagorean, and double angle (sine and cosine)). These will be included on the quiz day 3.**

****You will have a quiz on these review topics on Day 3. Be prepared!!****

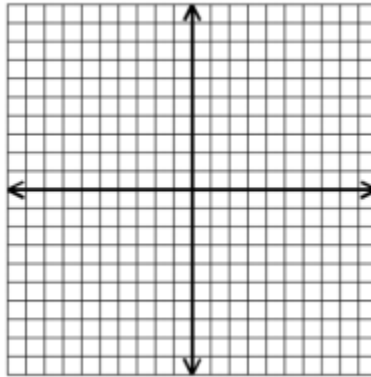
For each of the following, GRAPH – labeling axis values, determine domain and range in interval notation, discuss symmetry, and describe end behavior (if applicable).

1. $y = |x|$



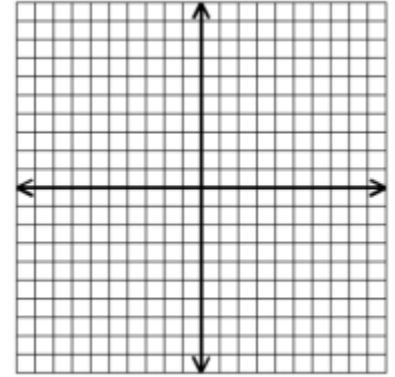
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

2. $y = x^2$



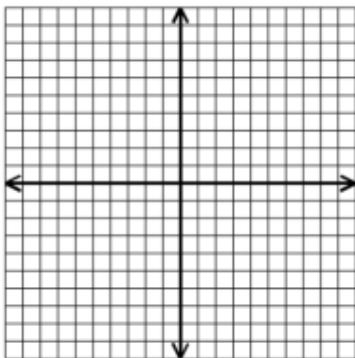
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

3. $y = x^3$



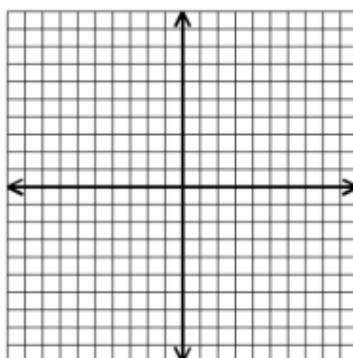
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

4. $y = \sin x$



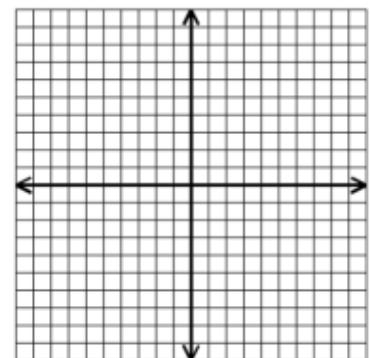
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 Period: _____

5. $y = \cos x$



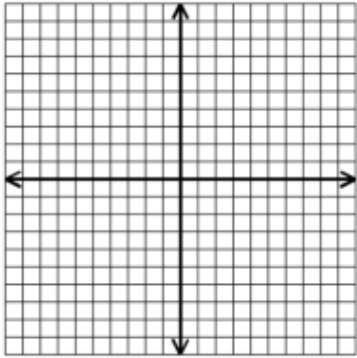
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 Period: _____

6. $y = \tan x$



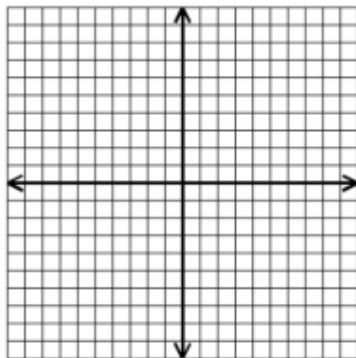
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 Period: _____

7. $y = \arctan x$



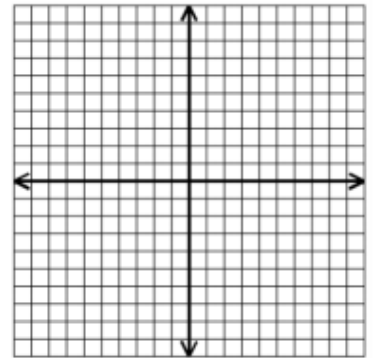
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

8. $y = e^x$



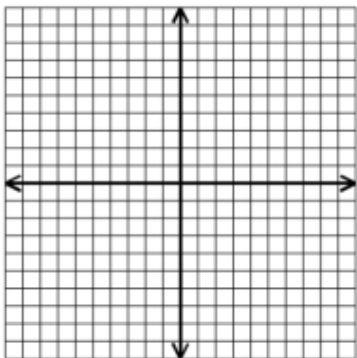
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

9. $y = \ln(x)$



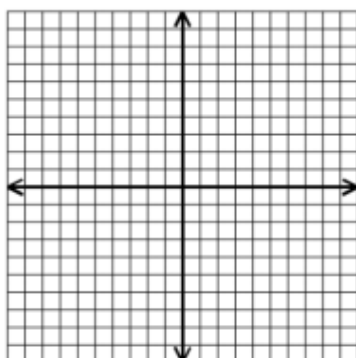
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

10. $y = \frac{1}{x}$



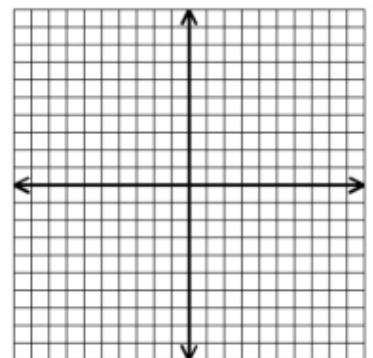
Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

11. $y = \sqrt{x}$



Domain: _____
 Range: _____
 Symmetry (even/odd): _____
 End behavior
 $\lim_{x \rightarrow -\infty} y =$ _____
 $\lim_{x \rightarrow \infty} y =$ _____

12. $y = \sqrt{9 - x^2}$



Domain: _____
 Range: _____
 Symmetry (even/odd): _____