Be rational

Get real.

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To incoming AP Calculus AB students,

To be best prepared for your AP Calculus AB course, you will complete a summer review assignment, which you will submit the first full week of school. This assignment will be graded and count as the first quiz of the first marking period. You will be able to access this assignment through ltps.org and/or classroom.google.com. The “Group Code” you will need for classroom.google.com is: dpzuxzc.

Google Classroom Group Code:

- Go to www.classroom.google.com
- Click on I’m a Student
- Enter access code to access the class. Code: dpzuxzc.

*This Google group has been established in order to provide you, the students, with support as a group. If you are struggling with concepts/material, there is a blog to post questions to one another. In addition, you have the educational resources listed below for additional assistance. Remember the math course from the current school year is the prerequisite course for the course you have enrolled into for the Fall. Your personal notebook and handouts from this year’s class is a resource that is at your disposal. The instructor may monitor the Google Classroom throughout the summer.*

You have signed up for AP CALC- AB, which by nature must proceed at a very fast pace. The best part of teaching AP CALC is realizing that we are all working together toward the same goal---great AP scores. Therefore, it’s not student vs. teacher, it’s student and teacher vs. AP test. In order to do well, you must stay on task and keep pace with the workload. I’m looking forward to a great year. I have selected a few pertinent problems from the preparation chapter.

**Directions:**

- Complete ALL problems.
- Show all work for every problem on a separate piece of paper
- Your work should be neatly organized and clearly labeled.

**Scoring/Grading:** The AP Calc AB Summer Assignment is worth a total of 59 points.

- Each problem (including a, b, c,...) is worth 1 point. Problems #24 – 28 are worth 1 point each, even though several answers need to be supplied.
- Any problem with no work shown will receive 0 points.
- When asked to explain or justify, you must write in full sentences and try not to use any pronouns ie: instead of saying “it has a zero”, say “the function has a zero”.
- Your teacher will enter your earned grade for Summer Assignment grade into Genesis.

**Resources:**
For additional examples and support you can reference any of the sites listed below and search the skill/concept.

- KhanAcademy.com
- You Tube.com or Teacher Tube.com
- MathIsPower4u.com
- IXL.com

See you in September.

Mr. Meehl
In problems 1 – 4, find any intercepts.

1. \( y = x^2 + x - 2 \)
2. \( y = x^2 \sqrt{25 - x^2} \)
3. \( y = \frac{3(2 - \sqrt{x})}{x} \)
4. \( x^2y - x^2 + 4y = 0 \)

5. Find the sales necessary to break even (R=C) if the cost C of producing x units is

\[
C = 5.5\sqrt{x} + 10,000 \quad \text{(Cost equation)}
\]

and the revenue R for selling x units is

\[
R = 3.29x. \quad \text{(Revenue equation)}
\]

6. Use a graphing calculator to graph both lines in each viewing window. Compare the graphs. Do the lines appear perpendicular? Are the lines perpendicular? Explain.

\[
y = x + 6, \quad y = -x + 2
\]

a) \( X_{\text{min}} = -10 \quad Y_{\text{min}} = -10 \)
\( X_{\text{max}} = 10 \quad Y_{\text{max}} = 10 \)
\( X_{\text{scl}} = 1 \quad Y_{\text{scl}} = 1 \)

b) \( X_{\text{min}} = -15 \quad Y_{\text{min}} = -10 \)
\( X_{\text{max}} = 15 \quad Y_{\text{max}} = 10 \)
\( X_{\text{scl}} = 1 \quad Y_{\text{scl}} = 1 \)

7. Write an equation of the line through the point (a) parallel to the given line and (b) perpendicular to the given line.

Pt. (2, 1) \quad \text{Line: } 4x - 2y = 3

8. You are given the dollar value of a product in 2001 and the rate at which the value of the product is expected to change during the next 5 years. Write a linear equation that gives the dollar value V of the product in terms of the year t. (Let t=0 represent 2000).

2001 Value: $20,400 \quad \text{Rate: $2000 decrease per year}

9. Use a graphing calculator to graph the parabolas and find their points of intersection. Find an equation of the line through the points of intersection and sketch its graph in the same viewing window.

\[
y = x^2
\]
\[
y = 4x - x^2
\]
For 10-11, evaluate (if possible) the function at the given value(s) of the independent variable. Simplify the results.

10. \( g(x) = 3 - x^2 \)
   (a) \( g(0) \)
   (b) \( g(\sqrt{3}) \)
   (c) \( g(-2) \)
   (d) \( g(t-1) \)

11. \( f(x) = x^3 \)
\( f(x + \Delta x) - f(x) \)
\( \Delta x \)

For 12 – 13, find the domain and range of the function.

12. \( h(x) = -\sqrt{x+3} \)
13. \( h(x) = \frac{1}{x} \)

14. Evaluate the function as indicated. Determine its domain and range.

\[
 f(x) = \begin{cases} 
 2x + 1, & x < 0 \\
 2x + 2, & x \geq 0 
\end{cases}
\]

(a) \( f(-1) \)  (b) \( f(0) \)  (c) \( f(2) \)  (d) \( f(t^2 + 1) \)

For 15 – 16, sketch a graph of the function and finds its domain and range. Use a graphing utility to verify your graph.

15. \( h(x) = \sqrt{x-1} \)
16. \( g(t) = 2 \sin(\pi t) \)

17. Determine whether \( y \) is a function of \( x \).
\[ y^2 = x^2 - 1 \]

For 18 – 21, determine whether the statement is true or false. If it is false, explain why or give an example that shows it is false.

18. If \( f(a) = f(b) \), then \( a = b \).
19. A vertical line can intersect the graph of a function at most once.
20. If f(x) = f(-x) for all x in the domain of f, then the graph of f is symmetric with respect to the y-axis.

21. If f is a function, then f(ax) = af(x).

22. Given f(x) = 2x – 3 and g(x) = cos x, find each composite function.
   a) f \circ g  
   b) g \circ f

23. Determine whether each function is even, odd, or neither. Then find the zeros of the function.
   a) f(x) = x^3 – x  
   b) 1 + cos x

24. Identify the relationships for all six trigonometric functions as they relate to x, y, and r.

25. Complete the unit circle below by supplying: the ordered pairs for each point; the radian measures of the angles; and the degree measures of the angles.
26. Identify the three trigonometric reciprocal identities.

27. Identify the two trigonometric quotient identities.

28. Identify the three trigonometric Pythagorean identities.
29. Graph \( y = \sin x \), for \((-2\pi \leq x \leq 2\pi)\)

30. Graph \( y = \cos x \), for \((-2\pi \leq x \leq 2\pi)\)
31. Graph $y = \tan$, for $-2\pi \leq x \leq 2\pi$}

Establish the identities below (i.e. make the left side look like the right side without using right side!)

32. $\csc \theta \cdot \tan \theta = \sec \theta$

33. $\frac{\sin^2(-\theta) - \cos^2(-\theta)}{\sin(-\theta) - \cos(-\theta)} = \cos \theta - \sin \theta$

34. $\frac{1 + \tan x}{1 + \cot x} = \tan x$

35. $\frac{\tan x + \cot x}{\sec x \csc x} = 1$
Solve the following equations for $0 \leq \theta \leq 2\pi$.

36. $2\sin \theta + \sqrt{3} = 0$

37. $2\sin^2 \theta - 3\sin \theta + 1 = 0$

38. $\cos(2\theta) + 3 = 5\cos \theta$

39. Evaluate the following limits.

a. $f(-2) = \bigskip$ 

b. $f(2) = \bigskip$ 

c. $\lim_{x \to 0} f(x) = \bigskip$ 

d. $\lim_{x \to 2} f(x) = \bigskip$

Evaluate the following limits algebraically. You must show your work for full credit.

40. $\lim_{\Delta x \to 0} \frac{(x + \Delta x)^2 - 3(x + \Delta x) - 2 - (x^2 - 3x - 2)}{\Delta x}$

41. $\lim_{x \to 3} \frac{x^2 - 8x + 15}{x - 3}$
42. \( \lim_{{x \to 11}} \frac{\sqrt{x + 5} - 4}{x - 11} \)  

43. \( \lim_{{x \to 2}} \frac{(x - 3)^3 (x + 2)}{x - 2} \)