AP Calculus AB Summer Work

Please complete all work on notebook paper. Then take clear pictures of each page of your work and submit to the assignment in Schoology by 8:10am on Monday, August 20. The pictures must be legible, problems clearly labeled in the order assigned, and no work will be accepted after this time. If you have any issues with submissions please message me through Schoology or e-mail me at megansteele@pickens.k12.sc.us. You will have a quiz on this material and your Unit Circle on the first day of class – no notes and no calculator.

Section 1.1 Lines p. 9 #3-30 multiples of 3 and 31, 32, 35

3. Find the coordinate increments (change in x and change in y) from *A* to *B*.

   A(-3, 1) *B*(-8, 1)

6. Let *L* be the line determined by points *A*(-2, -1) and *B*(1, -2).

   a) Plot *A* and *B*.

   b) Find the slope of *L*.

   c) Draw the graph of *L*.

9. *P*(3, 2)

   a) Write an equation for the vertical line through point *P*.

   b) Write an equation for the horizontal line through point *P*.

12. $P(-\pi, 0)$

   a) Write an equation for the vertical line through point *P*.

   b) Write an equation for the horizontal line through point *P*.

15. Write the point-slope equation for the line through the point *P*(0, 3) with slope m=2.

18. Write the slope-intercept equation for the line with the slope m= -1 and y-intercept b=2.

21. Write a general (standard form) linear equation for the line through the points (0, 0) and (2, 3).

24. Write a general (standard form) linear equation for the line through the points (-2, 1) and (2, -2).

27. $3x + 4y = 12$

   a) Find the slope.

   b) Find the y-intercept.

   c) Graph the line.

30. $y = 2x + 4$

   a) Find the slope.

   b) Find the y-intercept.

   c) Graph the line.

31. $P(0, 0)$ $L: y = -x + 2$

    a) Write an equation for the line through P that is parallel to L.

    b) Write an equation for the line through P that is perpendicular to L.

32. $P(-2, 2)$ $L: 2x + y = 4$

    a) Write an equation for the line through P that is parallel to L.

    b) Write an equation for the line through P that is perpendicular to L.

35. A table of values is given for the linear function $f(x) = mx + b$. Determine m and b.

x	$f(x)$
1	2
3	9
5	16

Section 1.2 Functions and Graphs p.19 #3-42 multiples of 3

3. The surface area S of a cube as a function of the length of the cube's edge e; the surface area of a cube of edge length 5ft

    a) Write a formula for the function

    b) Use the formula to find the indicated value of the function.

6. $y = x^2 - 9$

    a) Identify the domain and range.

    b) Sketch the graph of the function.

9. $y = \frac{1}{x-2}$

    a) Identify the domain and range.

    b) Sketch the graph of the function.

12. $y = 1 + \frac{1}{x^2}$

    a) Identify the domain and range.

    b) Sketch the graph of the function.

15. $y = \sqrt[3]{1 - x^2}$ Use a calculator to:

    a) Identify the domain and range.

    b) Sketch the graph of the function.

18. $y = x^{3/2}$ Use a calculator to:

    a) Identify the domain and range.

    b) Sketch the graph of the function.

21. Determine whether $y = x^4$ is even, odd, or neither.

24. Determine whether $y = x^2 - 3$ is even, odd, or neither.

27. Determine whether $y = \dfrac{x^3}{x^2-1}$ is even, odd, or neither.

30. Determine whether $y = \dfrac{1}{x^2-1}$ is even, odd, or neither.

33. Graph $f(x) = \begin{cases} 4 - x^2, & x < 1 \\ \left(\frac{3}{2}\right)x + \frac{3}{x}, & 1 \le x \le 3 \\ x + 3, & x > 3 \end{cases}$

36. For a curve to be symmetric about the x-axis, the point (x, y) must lie on the curve if and only if the point (x, -y) lies on the curve. Explain why a curve that is symmetric about the x-axis is not the graph of a function, unless the function is y=0.

39. Use the vertical line test to determine whether the curve is the graph of a function.
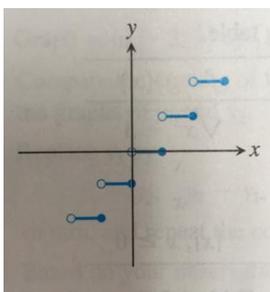
42. Write a piecewise formula for the function.
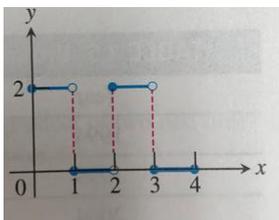
Section 1.3 Exponential Functions p. 26 #3-30 multiples of 3

3. Graph the function $y = 3 \cdot e^{-x} - 2$. State its domain and range.
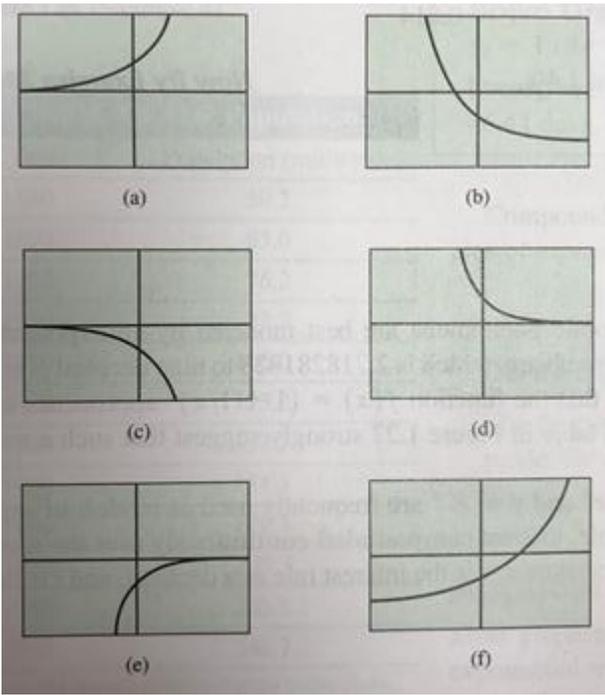
6. Rewrite the exponential expression 16^{3x} to have a base of 2.

9. Use a graph to find the zeros of the function $f(x) = 2^x - 5$.

12. Use a graph to find the zeros of the function $f(x) = 3 - 2^x$.

15. Match the function $y = -3^{-x}$ to its graph below. Try to do it without using your calculator.

18. Match the function $y = 1.5^x - 2$ to its graph below. Try to do it without using your calculator.

(a) (b)

(c) (d)

(e) (f)

21. The population of Knoxville is 500,000 and is increasing at a rate of 3.75% each year. Approximately when will the population reach 1 million?

24. If John invests $2300 in a savings account with a 6% interest rate compounded annually, how long will it take until John's account has a balance of $4150?

27. Determine how much time is required for an investment to double in value if interest is earned at the rate of 6.25% compounded continuously.

30. Determine how much time is require for an investment to triple in value if interest is earned at the rate of 5.75% compounded continuously.

Section 1.5 Functions and Logarithms p. 33 #4-44 multiples of 4 (omit 28 and 32)

4. Determine whether the function is one-to-one.
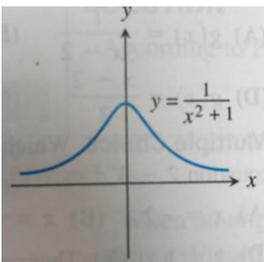
8. Determine whether $y = x^2 + 5x$ has an inverse function.

12. Determine whether $y = 2^{3-x}$ has an inverse function.

16. Find $f^{-1}(x)$ and verify that $(f \circ f^{-1})(x) = (f^{-1} \circ f)(x) = x$ if $f(x) = x^2 + 1, x \geq 0$.

20. Find $f^{-1}(x)$ and verify that $(f \circ f^{-1})(x) = (f^{-1} \circ f)(x) = x$ if $f(x) = x^2 + 2x + 1, x \geq -1$.

24. Find $f^{-1}(x)$ and verify that $(f°f^{-1})(x) = (f^{-1}°f)(x) = x$ if $f(x) = \frac{x+3}{x-2}$.

36. Solve $2^x + 2^{-x} = 5$ algebraically. Support your solution graphically.

40. Draw the graph of $y = -3\log(x + 2) + 1$ and determine the domain and range of the function.

44. Find $f^{-1}(x)$ and verify that $(f°f^{-1})(x) = (f^{-1}°f)(x) = x$ if $f(x) = \frac{50}{1+1.1^{-x}}$.

Section 1.6 Trigonometric Functions p. 51 #3-42 multiples of 3

3. The angle lies at the center of a circle and subtends an arc of the circle. If the angle has radius 14 and arc length 7, what is the measure of the angle?

6. Determine if the tangent function is even or odd.

9. Find all six of the trigonometric values of θ when $\cos\theta = -\frac{15}{17}$, $\sin\theta > 0$.

12. $y = 2\sin(4x + \pi) + 3$

    a) Find the period.

    b) Find the domain.

    c) Find the range.

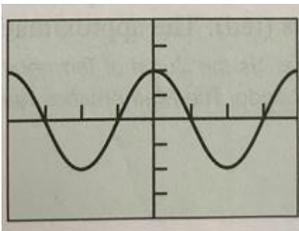   d) Draw a graph of the function.

15. Choose an appropriate viewing window to display two complete periods of each function in radian mode.

    a) $y = \sec x$

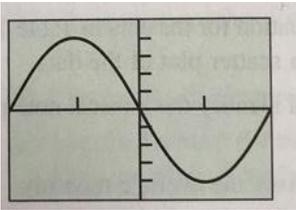   b) $y = \csc x$

    c) $y = \cot x$

18. $y = 2\cos 3x$

    a) Specify the period.

    b) Specify the amplitude.

    c) Identify the viewing window shown.

21. $y = -4\sin\frac{\pi}{3}x$

    a) Specify the period.

    b) Specify the amplitude.

    c) Identify the viewing window shown.

24. The table below gives the average monthly temperatures for St. Louis for a 12-month period starting with January. Model the monthly temperature with an equation of the form $y = a\sin[b(t - h)] + k$, y in degrees Fahrenheit, t in months.

Time (months)	Temperature (°F)
1	34
2	30
3	39
4	44
5	58
6	67
7	78
8	80
9	72
10	63
11	51
12	40

27. Give the measure of the angle in radians and degrees of $\sin^{-1}(0.5)$.

30. Give the measure of the angle in radians and degrees of $\cos^{-1}(0.7)$.

33. Solve the equation on the specified interval.

    $\csc x = 2, \ 0 < x < 2\pi$

36. Solve the equation on the specified interval.

    $\cot x = -1, \quad -\infty < x < \infty$

39. The point P(-3, 4) is on the terminal side of θ. Find the values of the six trigonometric functions at the angle θ. Give exact answers.

42. Evaluate the expression $\tan(\sin^{-1}\frac{9}{13})$.