AP Calculus AB Summer Assignment

I look forward to having you in AP Calculus next year. To start off the semester with Calculus, it will be mandatory for you to complete the summer assignment, which consists mostly of a review of algebra concepts, graphing, and a few trigonometry concepts.

You must do each of the problems without a calculator, showing all steps leading to the solution in a neat and organized manner. Please do the work on a separate piece of paper (binder paper or graph paper). Clearly indicate your answer. **Please use a pencil (no pens).**

This assignment will be worth a grade and is DUE ON THE 1st DAY of class in AUGUST. Partial credit will be given if you turn it in late. You will be **quizzed on these concepts** at various times during the first semester.

Web sites that might be helpful! ☺
Math definitions and formulas: www.mathwords.com (look on the left side for the index of words under algebra, geometry, etc)

Algebra/Trig Review: www.mastermathmentor.com On the left side of this page, you will see RU Ready. Click on that, then scroll down to "Free Downloads", topics A – U. These pages have examples of problems that might help you for the summer assignment.

Cheat Sheets for Algebra and Trig: http://tutorial.math.lamar.edu/cheat_table.aspx (You might want to print some of these cheat sheets for reference purposes only).

Khan Academy: www.khanacademy.org has some excellent videos on many math topics. The videos usually are less than 10 minutes long.

- Use these websites to review the concepts as necessary. You can also send me an email if you have questions and I will try my best to respond to your email. However, there will be times that I will be on vacation and will not have access to email. tfarmer@centralusd.k12.ca.us

- Enjoy your summer!

- Note: Ti–84, Ti–84+, Ti–89, or Ti–89 titanium are recommended for this course. **You will need a graphing calculator, pencils, red-ink pen for corrections, binder, notebook, and lots of graph paper for this course.**

- The syllabus for this course will be given to you within the first 10 days of school.

Factor completely:

1) $x^2 - 4x + 4$

2) $x^2 + 12x + 36$

3) $4x^2 + 4x + 1$

4) $x^2 + 2x - 3$

5) $3x^2 - 5x + 2$

6) $2x^2 - 32$

7) $x^4 - 25$

8) $x^3 - 64$

9) $y^3 + 8$

10) $x^3 - 4x^2 - x + 4$

11) $x^3 - 10x^2 - 25x + 250$

12) $x^2 - 5x + 6$

Calculate the Zeroes (x-intercepts) of each of the following:

13) $x^2 - 5x + 4 = y$

14) $x^2 + 8x + 16 = y$

15) $x^2 + 8x + 7 = h(x)$

16) $y = 5x - 3$

17) $3y - 16 = 3x + 7$

18) $f(x) = \sqrt{4x + 8}$

19) $x^2 - 36 = g(x)$

20) $y = 2x^2 - 5x + 7$

21) $y = x^3 - 27$

22) $y = \dfrac{3x + 12}{x + 4}$

Simplify (rewrite without parentheses):

23) $(x^2 - 2x)(x - 3)$

24) $(x - y + 1)(x + y)$

Expand the binomials: (Hint: use Pascal's triangle and the binomial expansion method)

25) $(x + y)^2$

26) $(x + y)^3$

27) $(x + y)^5$

28) $(2x - 3y)^4$

Calculate the slope algebraically: (use the algebraic formula for #29 – 30)

29) Calculate the slope between the points $(5, -10)$ *and* $(-12, 20)$

30) Calculate the slope between the points $(-245, 101)$ *and* $(-134, 205)$

31) A business installs a wheelchair ramp that rises 22 inches over a horizontal length of 24 feet. What is the slope of the ramp? (Hint: pay close attention to the unit of measure).

Linear Equations: Use the **point-slope form** for the equation of a line. Do not use the slope-intercept method.

32) Calculate the equation of the line with a slope of 2, that passes through the point (0 ,4).

33) Calculate the equation of the line with a slope of $\frac{-3}{2}$, that passes through the point (8 , - 6).

34) Calculate the equation of the line that passes through the points $(3,-10)$ *and* $(-15,20)$.

35) Calculate the equation of the line that passes through the points $(-32,-14)$ *and* $(13,21)$.

36) Calculate the equation of the line that is parallel to the line y = 4x - 6 and passes through the point (5, 8).

37) Calculate the equation of the line that is perpendicular to the line y = 2x + 5 and passes through the point (9, -14).

Distance: Use the distance formula to determine the distance between the sets of ordered pairs.

38) $(5, 9)\, and\, (8,12)$ 39) $(-15, 9)\, and\, (-20, 32)$ 40) $(5, 9)\, and\, (a, b)$

Rationalizing:

Rationalize the denominator

41) $\frac{3}{\sqrt{7}}$ 42) $\frac{2\sqrt{3}}{\sqrt{5}}$ 43) $\frac{2+\sqrt{3}}{\sqrt{6}}$ 44) $\frac{1}{\sqrt{5}+\sqrt{2}}$

Rationalize the numerator

45) $\frac{\sqrt{2}}{3}$ 46) $\frac{2\sqrt{3}}{11}$ 47) $\frac{2+\sqrt{3}}{5}$ 48) $\frac{\sqrt{x-1}}{7}$

Fractions:

Add / subtract the fractions

49) $\frac{5}{7}+\frac{8}{13}$ 50) $\frac{2}{x}-\frac{3}{5}$ 51) $\frac{2}{x}+x$

52) $\frac{1}{x+1}+\frac{2}{x-1}$ 53) $\frac{3x}{x^2-1}-\frac{3}{x-1}$ 54) $\frac{1}{x}+\frac{3}{2x^2}+\frac{4}{x+2}$

Simplify

55) $\frac{5x}{3}\cdot\frac{6}{7x^2}$ 56) $\frac{9}{x^2}\div\frac{3}{x}$ 57) $\frac{x^2-4x+3}{x^2-5x+6}$

58) $\frac{x^2-4}{4x+8}$ 59) $\frac{3x^2}{5x+15}\cdot\frac{x^2+4x+3}{6x^2-6}$ 60) $\frac{(3x-1)}{(3x-1)^{\frac{1}{2}}}$

Exponents:

Rewrite each of the following without negative exponents.

61) 8^{-2} 62) x^{-3} 63) $\frac{3^{-3}}{x^{-6}}$ 64) $\frac{3x}{2x^{-5}}$

Rewrite each of the following as an exponential expression (no fractions).

65) $\frac{1}{4}$ 66) $\frac{2}{x^3}$ 67) $\frac{1}{(2x-3)^3}$ 68) $\frac{3x}{(2x)^5}$

Rewrite each expression **without** fractional exponents.

69) $16^{\frac{3}{4}}$ 70) $x^{\frac{3}{5}}$ 71) $(4x+2)^{\frac{3}{2}}$ 72) $\frac{1}{x^{\frac{2}{3}}}$

Rewrite each expression **with** fractional exponents.

73) $\sqrt{3}$ 74) $2\sqrt[4]{3}$ 75) $\sqrt[3]{2x}^{\,5}$ 76) $\sqrt[5]{(3-6x)^2}$

Evaluating functions:

If $f(x)=2x-5,\quad g(x)=(x-1)^2,\quad and\ \ h(x)=\frac{2x+1}{5x+6}$, what is …

77) $f(2)$ 78) $g(-2)$ 79) $h(4)$ 80) $f(g(2))$

81) $g(3a)$ 82) $f(d+3)$ 83) $h(-2)$ 84) $h\left(\frac{1}{2}\right)$

85) $g(h(0))$ 86) $g(t+\Delta t)$ 87) $f(x)=0$ 88) $h(x)=0$

Domain, Continuity, Asymptotes, and Holes:

Determine the domain for each of the following functions. State if the function is continuous or discontinuous and where any holes or asymptotes occur.

89) $f(x) = 2x + 6$

90) $g(x) = \dfrac{1}{x}$

91) $h(x) = \sqrt{3x - 1}$

92) $k(x) = \dfrac{3}{x+1}$

93) $p(x) = \dfrac{5x+6}{x^2+2}$

94) $r(x) = \begin{cases} 2x-1, & x < 3 \\ x^2, & x \geq 3 \end{cases}$

Special Trigonometric ratios:

Evaluate each of the following expressions. (angles are given in radians)

95) $\cos\pi$

96) $\sin\dfrac{-\pi}{2}$

97) $\tan\dfrac{3\pi}{4}$

98) $\csc\dfrac{\pi}{6}$

99) $\sec^2\dfrac{4\pi}{3}$

100) $\cot\dfrac{2\pi}{3}$

101) $\sec\dfrac{5\pi}{6}$

102) $\sin\dfrac{5\pi}{6} + \tan\dfrac{-5\pi}{4}$

Logarithms:

Evaluate each logarithmic expression:

103) $\log_2 16 + \log_2 64$

104) $\ln e^2$

105) $\log_5 1$

Solve each logarithmic function:

106) $\log_3 x = 8$

107) $\ln(2x-3) = -2$

108) $\log_2 32 = x$

Graphing: <u>**Graph each family of functions on its own set of axes**</u>. i.e. # 109, parts a, b, and c all on one set of axes. #110 on its own set of axes, etc. You need to make sure that you can recognize from an equation the shape of its graph and graph it quickly without the use of a calculator. **Use a different colored pencil for <u>each graph</u> in a particular family**.

109) **Linear Functions** a) $y = x$ b) $y = 2x - 1$ c) $y - 3 = \dfrac{-1}{4}(x+1)$	110) **Quadratic Functions** a) $f(x) = x^2$ b) $g(x) = -2x^2 + 4$ c) $h(x) = (x+1)^2 - 3$	111) **Absolute Value Functions** a) $f(x) = \lvert x \rvert$ b) $g(x) = \lvert 2x - 1 \rvert$ c) $h(x) = -\lvert x+3 \rvert - 2$
112) **Exponential Functions** a) $f(x) = 2^x$ b) $g(x) = 2^x + 4$ c) $h(x) = 2^{(x-3)}$	113) **Sinusoidal Functions** **Graph one cycle of each** a) $h(x) = \cos x$ b) $k(x) = \sin x$	114) **Piecewise Functions** a) $f(x) = \begin{cases} 2x+3, & \text{if } x < 3 \\ x^2, & \text{if } x \geq 3 \end{cases}$ b) $g(x) = \begin{cases} 3, & \text{if } x < -1 \\ -x^2, & \text{if } -1 < x \leq 1 \\ -2x+4, & \text{if } x > 1 \end{cases}$