AP Calculus Summer Packet

The following packet is due for accuracy the first day back from summer break. It will count as your first grade! To make sure you do well in the class, if you need help, ask a friend or email one of us.

Show work for every problem on a separate piece of paper. Simplify your answers. **No Work=No Credit**. *This packet is intended to be done without a calculator*.

Feel free and contact either of us over the summer:
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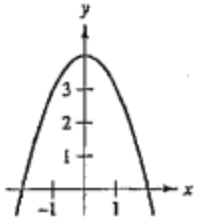
Calculator needed for next year:
A graphing calculator is needed. We recommend the TI-84 CE.

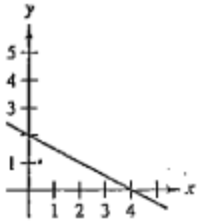
Do not get a Casio calculator (even though it is cheaper)! It usually goes on sale at the end of the summer. (Talk to one of us if you truly have financial need)

For questions #1-4, match the equations with its graph.

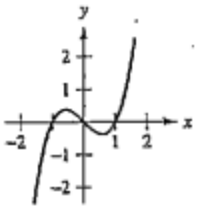
(a)



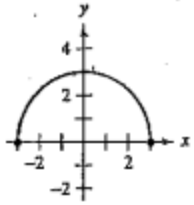
(b)



(c)



(d)



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

In Exercises 5-21, sketch the graph of the equation

5) $y = \frac{3}{2}x + 1$

6) $y = 4 - x^2$

7) $y = |x + 2|$

8) $y = \sqrt{x} - 4$

9) $y = \frac{2}{x}$

10) $y = 6 - 2x$

11) $y = (x - 3)^2$

12) $y = |x| - 1$

13) $y = \sqrt{x + 2}$

14) $y = \frac{1}{x - 1}$

15) $f(x) = \begin{cases} x + 2 & \text{if } x < 0 \\ 1 - x & \text{if } x \geq 0 \end{cases}$

16) $f(x) = \begin{cases} 3 - \frac{1}{2}x & \text{if } x \leq 2 \\ 2x - 5 & \text{if } x > 2 \end{cases}$

17) $f(x) = \begin{cases} x + 2 & \text{if } x = 3 \\ x^2 & \text{if } x \neq 3 \end{cases}$

18) $f(x) = \begin{cases} -1 & \text{if } x \leq -1 \\ 3x + 2 & \text{if } |x| < 1 \\ 7 - 2x & \text{if } x \geq 1 \end{cases}$

19) $y = \sin\frac{x}{2}$

20) $y = 2\cos 2x$

21) y= 2tanx

Graph using end behavior and multiplicity

22) $f(x) = -2(x - 1)(x + 2)^2(x + 5)^3$

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

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

24) $f(x) = 5 - 7x$

a. $f(4)$ b. $f(x + 3)$ c. $f(-x)$

Solve using the quadratic formula:

25) $x^2 = 2x + 4$

26) $x^2 - 2x + 19 = 0$

Solve the equation:

27) $2\sqrt{x - 1} = x$.

28) $|2x - 5| - 3 = 0$

29) $x^3 + 2x^2 = 9x + 18$

find the domain of each function.

36.) $f(x) = x^2 + 6x - 3$

31) $h(x) = \sqrt{8 - 2x}$

32) $g(x) = \frac{\sqrt{x - 2}}{x - 5}$

33) f(x)=ln(x+2)

Graph by find the vertical/horizontal asympotes, holes, and x-intercepts.

34) $f(x) = \frac{x}{x^2 - 16}$

35) $f(x) = \frac{x + 1}{x^2 + 2x - 3}$

36) $f(x) = \frac{x^2 - 9}{x - 2}$

37) $f(x) = \frac{4x^2 - 13x + 3}{x^2 - 9}$

38) Given $f(x) = \sqrt{x}$ and $g(x) = x^2 - 1$, evaluate each expression.

(a) $f(g(1))$ (b) $g(f(1))$ c) $f(g(x))$

39) *If $f(x) = x^2 + 3x - 4$ and $g(x) = 5x - 2$, find each function or function value*

a) $(f - g)(x)$ b) f(g(x)) c) $f(g(2))$

Solve the following using a sign chart:

40. $x^2 + 4x + 3 > 0$

41. $x^2 < x + 2$

42. $(x - 2)^3(x + 1)^2(x - 4) \geq 0$

Find the x and y intercepts:

43. $y = x^2 + x - 2$

44. $y = x^3 - 4x$

Find the inverse:

45. $f(x) = \sqrt{10 - 3x}$

46. $f(x) = \frac{4x-1}{2x+3}$

Write an equation of a line through the given point and parallel to the given line:

47. $(2, 1)\ and\ 4x - 2y = 3$

48. $(-2, 3)\ and\ x + 2y = 8$

Write in exponential form:

49. $\frac{1}{2} = log_{49}7$ 50. $3 = lnx$

Write in logarithmic form:

51. $6^3 = 216$ 52. $b^4 = 625$

Evaluate the logs without a calculator:

53. $log_4 64$ 54. $log_5 \frac{1}{125}$ 55. $log_3(-9)$

Solve for x:

56. $e^{-x} = 5$ 57. $ln(5 - 2x) = -3$

58. $lnx + ln(x - 1) = 1$ 59. $log_4 20 = x$

60. Under ideal conditions a certain bacteria population is known to double every three hours. Supposes that there are initially 100 bacteria.

a) What is the population after 15 hours?
b) What is the population after t hours?
c) Estimate the population after 20 hours?
d) Graph the population function?
e) Estimate the time that the population is 50,000.

61. Find the average rate of change of $f(x) = 3x^2 - 5$ From x=6 to x=10

62. Evaluate the trig (no calculator):

a) $sin\frac{\pi}{6}$ b) $cos\frac{7\pi}{6}$ c) $tan\frac{5\pi}{3}$
d) $sec\frac{4\pi}{3}$ e) $cos\frac{3\pi}{2}$ f) $cot\frac{3\pi}{4}$
g) $cos\frac{11\pi}{4}$ h) $csc\frac{5\pi}{3}$ i) $sin\pi$
j) $tan\frac{7\pi}{6}$ k) $sec(-\pi)$ l) $sec\frac{3\pi}{2}$

63. Solve the trig equations (answers from $0 \leq \theta < 2\pi$):

a) $2sin^2\theta = 1$ b) $tan^2\theta - tan\theta = 0$
c) $2cos^2\theta - 3cos\theta + 1 = 0$ d) $sin\theta = -cos\theta$

For questions #64-67 find the indicated limit:

64. $f(x) = \begin{cases} \sqrt{1 - x}, & x \leq 1 \\ x + 1, & x > 1 \end{cases}$

a) $\lim_{x \to 1^-}$ b) $\lim_{x \to 1^+}$ c) $\lim_{x \to 1}$ d) $\lim_{x \to \infty}$

e) Is it continuous at 1? f) why?
g) If not, type of discontinuity?

65. $f(x) = \begin{cases} 2x + 1, & x < 2 \\ 3, & x = 2 \\ 3x - 1, & x > 2 \end{cases}$

a) $\lim_{x \to -\infty}$ b) $\lim_{x \to 2^-}$ c) $\lim_{x \to 2^+}$ d) $\lim_{x \to 2}$ e) $\lim_{x \to \infty}$

f) Is it continuous at 2? g) Why?
h) If not, type of discontinuity?

66. $f(x) = \frac{2x^2+5x+2}{x^2+x-2}$ *(Hint: graphing makes this easier!)*

a) $\lim_{x \to -\infty}$ b) $\lim_{x \to -2^-}$ c) $\lim_{x \to -2^+}$ d) $\lim_{x \to -2}$

e) $\lim_{x \to 1^-}$ f) $\lim_{x \to 1^+}$ g) $\lim_{x \to 1}$ h) $\lim_{x \to \infty}$

i) Is it continuous at - 2? j) why?

k) If not, type of discontinuity? l) Is it continuous at 1?

m) why? n) If not, type of discontinuity?

67. Do the following limits without graphing (unless you are stuck)

a) $\lim_{x \to 4} \sqrt{x+2}$

b) $\lim_{x \to 2} \frac{x-2}{x^2-4}$

c) $\lim_{x \to 3} \frac{x^2-9}{x-3}$

d) $\lim_{x \to 4} \frac{\sqrt{x}-2}{x^2-16}$

e) $\lim_{x \to 2} \frac{x^3-8}{x^2-4}$

f) $\lim_{x \to -2^-} \frac{2x^2+x+1}{x+2}$

g) $\lim_{x \to 0} \frac{\sin 2x}{3x}$

h) $\lim_{x \to \infty} \frac{3x^2+27}{x^3-27}$

i) $\lim_{x \to \infty} \frac{4-x^2}{x^2-1}$

j) $\lim_{x \to -\infty} \frac{5x^3+27}{20x^2+10x+9}$

k) $\lim_{x \to \infty} \frac{4-x^2}{4x^2-x-2}$

l) $\lim_{x \to \infty} \frac{-6x^4+2}{2x^2+1}$

m) $\lim_{x \to -\infty} \frac{5-x}{4x^3+1}$