Beverly Hills High School -- AP Calculus BC -- F'16 Exam #1 -- Sections 2.1-2.4 -- 95 pts

Show all your work. Partial credit for partial performance. No copying of any kind. Show everything you want considered in a neat and complete manner. If I cannot read it, you don't score.

1) A particle moves in one dimension. The distance in cm it covers in the x direction is governed by the equation (ten points)

$$x(t) = -\frac{2}{3}t^3 + 3t^2 - t + 2$$

a) Calculate its displacement over the first three seconds of its motion.
b) To the nearest second, when is the particle once again motionless (after t=0)?
c) To the nearest second, when has the particle returned to position zero, that is, when is x(t) = 0

Determine the following limits (five points each):

2) $\lim_{x->4} \frac{8-x}{x^2}$

3) $\lim_{x->16} (\log_8 x)$

4) $\lim_{x->\pi/6} (\frac{\pi}{x}\cos 2x)$

5) $\lim_{t->0} \frac{4\sin 5t}{5\sin 3t}$

6) $\lim_{x->0} \frac{e^x \sin x + \sin x}{x}$

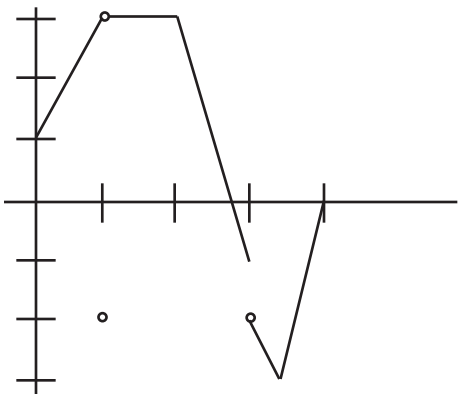
7) $\lim_{x->\infty} \frac{4x^3 + 2x - 8}{24 - 12x^2 - 3x^3}$

For ten points each, using the equation we derived in class for finding the slope of a tangent to a curve, find the slope of the tangent to the graph of the following functions (MUST SHOW WORK!):

8) $f(x) = -3x^2 + 2x - 4$

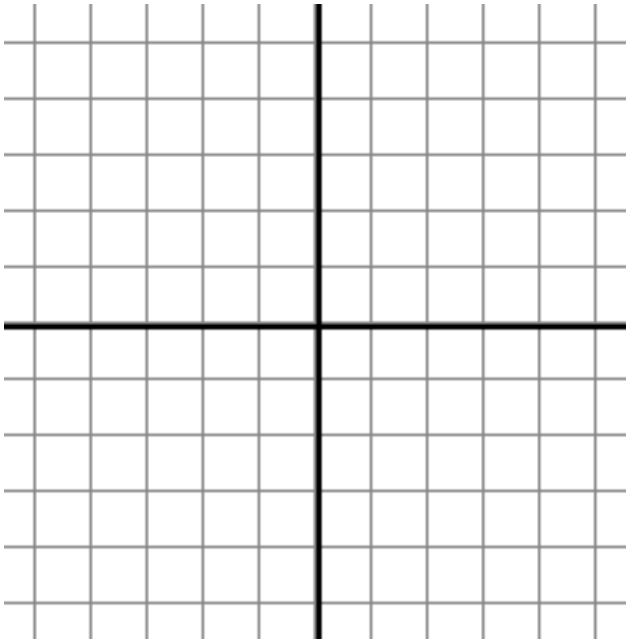
9) $f(t) = \frac{-3}{t}$

10) Using the fictitious (and silly) function below, discuss the continuity of each interval and discuss the limits and values of the function at each integral value of x. Ten points.



11) For the following function, determine what asymptotes exist (and their location); then graph it (ten pts):

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



12) For the following function, state appropriate right- AND left-end behavior models. Five points.

$$f(x) = 5x^3 - 2\ln x^4 + \frac{\sin x}{2} + e^{-2x}$$

13) For $x \neq 4$, the function g(x) is equal to $\frac{3x^2 - 19x + 28}{3x - 12}$. What value should be assigned to g(4) to make g(x) continuous at x = 4? Five points.

14) The curve $y = ax^2 + bx + c$ (with constants a, b, and c) passes thru the point (1, 3) and the tangent line at the point (0, 4) is given by y = -2x + 4. Find a, b, and c.