Math 10A
Winter Quarter 2009

Common Mistakes in Midterm 1

The following are common mistakes seen in the last 3 problems of Midterm #1. The wrong things are in red.

3. Most of the mistakes in this problem were basic algebra.

- Plugging problem
  Given the function $g(x) = -2x^2 + x - 3$
  Right: $g(x + 0.1) = -2(x + 0.1)^2 + (x + 0.1) - 3$
  Wrong: $g(x + 0.1) = (-2x^2 + x - 3) + .01$
  Wrong: $g(x + 0.1) = -2(x + 0.1)^2 + x - 3$

  Right: $g(x + h) = -2(x + h)^2 + (x + h) - 3$
  Wrong: $g(x + h) = -2x^2 + x - 3 + h$
  Wrong: $g(x + h) = -2(x + h)^2 + x - 3$

- Cancellation problem
  In part b), a lot of people got
  \[ g'(x) = \lim_{h \to 0} \frac{-4hx - h^2 + h}{h} \]
  and wanted to cancel out $h$ from the numerator and denominator.
  Right: $\lim_{h \to 0} \frac{-4hx - h^2 + h}{h} = \lim_{h \to 0} -4x - h + 1$
  Wrong: $\lim_{h \to 0} \frac{-4hx - h^2 + h}{h} = \lim_{h \to 0} -4x - h$ (constant 1 is missing)
  This mistake might come from the habit of crossing out canceling term (when the term $h$ in numerator was crossed out, nothing was left for that term). That only works when you factor out the term $h$ first.
  Right: $\lim_{h \to 0} \frac{-4hx - h^2 + h}{h} = \lim_{h \to 0} \frac{h(-4x - h + 1)}{h} = \lim_{h \to 0} -4x - h + 1$

4. Rainfall problem

- Practical meaning vs geometrical meaning
  A lot of people misused geometrical meaning as practical meaning
and answered “$f'(10) = 2$ is the slope of ...” which was right statement but did not get any credit.

• From what was given on the problem $f(10) = 8$ not $f(8) = 10$

5. Graph problem
   Even though the problem stated clearly that the graph was the graph of $f'$ a lot of people still used as it was the graph of $f$. 