

Math 122B-008 Worksheet 3

Please write out your solutions on a separate piece of paper. You do not have to print out and staple this page to your assignment.

1. Suppose we have the following samples of a continuous function  $T(x)$ :

$x$	1.0	1.4	1.8	2.2	2.6
$T(x)$	1.06	2.2	3.2	2.8	3.1

Estimate the following using the above data:

- (a)  $T'(1.4)$
- (b)  $T'(2.4)$
- (c)  $\lim_{h \rightarrow 0} \frac{T(1.4 + h) - T(1.4)}{h}$
- (d) The average rate of change of  $T'(x)$  between  $x = 1.4$  and  $x = 2.4$  (yes, the average rate of change of the *derivative*, not the original function!)
- (e)  $\left. \frac{dC}{dx} \right|_{x=1}$
- (f) Using your previous estimate for the derivative, find the (approximate) equation of the tangent line to the graph  $y = T(x)$  at  $x = 1$ .

2. Suppose that  $F(x)$  is a continuous function, and we have samples of its *derivative* at 3 points:

$x$	12	12.4	13
$F'(x)$	2	3	3.5

Use the above values to estimate the missing  $F(x)$  values in the table below:

$x$	12	12.4	13
$F(x)$	8		

3. Let  $g(x) = 3^x$ . Estimate  $g'(1)$  *numerically* by choosing small values of  $h$  and approximating the limit.
4. Let  $h(s) = 1/s^2$ . Compute  $H'(s)$  algebraically using the limit definition. Check your answer with the power rule, but you must show all algebraic steps in computing the limit!