Problem Set #59

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Problem 1

(a) $f'(3) = 1.5$

(b) $f'(-2) = 1$

(c) $f'(-1) = 0$

(d) $f'(0) = -3$

(e) $f'(1) = 0$

(f) $f'(2) = 1$

(g) $f'(3) = 1.5$

Problem 5

(a) The rate of change of the unemployment rate at some time t. Units are percent per year.

(b)

t	1993.5	1994.5	1995.5	1996.5	1997.5	1998.5	1999.5	2000.5	2001.5
$U'(t)$	-0.8	-0.5	-0.2	-0.5	-0.4	-0.3	-0.2	0.7	0.9

Problem 6

Derivative of a is b. The "peak" of b corresponds to the steepest slope of a, and b approaches 0 as the slope of a flattens. c is the derivative of b. The "dip" on c represents the downward slope of b at that point. Therefore, a is f, b is f' and c is f''.

Problem 9

$$
\begin{aligned}
&\lim_{h\to 0} \frac{f(x+h) - f(x-h)}{2h} \\
&= \lim_{h\to 0} \frac{f(x+h) - f(x) + f(x) - f(x-h)}{2h} \\
&= \lim_{h\to 0} \frac{f(x+h) - f(x)}{2h} + \lim_{h\to 0} \frac{f(x) - f(x-h)}{2h} \\
&= \frac{\lim_{h\to 0} \frac{f(x+h) - f(x)}{h}}{2} + \frac{\lim_{h\to 0} \frac{f(x) - f(x-h)}{h}}{2} \\
&= \frac{f'(x)}{2} + \frac{f'(x)}{2} \\
&= f'(x)
\end{aligned}
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