

MTH 131 FALL 2001
SECTIONS 8 and 9
Practice Problems for Exam 2

1. Certain pieces of antique increased very rapidly in price in the 1070's and 1980's. For example the Value of a particular rocking chair is well approximated by the formula $V = 75(1.35)^t$, where V is in dollars and t is the number of years since 1975.
- What was the value of the rocking chair in 1980?
 - When was the chair worth \$600.
 - Find the rate at which the value of the chair was increasing in 1980.

2. Find the equation of the tangent line to the graph of the function $f(x) = 2x - e^{-3x}$ at the point $(0, -1)$.

3. Let the function g be given by the following table.

t	0	2	4	6	8
g	54	75	90	102	110

- Give a table defining the derivative function g' .
 - Use the table found in (a) to estimate $g(5)$.
4. Use your calculator to estimate the following limits (use smaller and smaller values of h , at least 3 values)

(a) $\lim_{h \rightarrow 0} \frac{5^h - 1}{h}$ (b) $\lim_{h \rightarrow 0} \frac{e^{1+h} - 1}{h}$

5. Use **algebra** (Use the definition of the derivative function:

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}) \text{ to find } f'(x) \text{ for } f(x) = x^3 + 2x - 1. \text{ (Note you need}$$

to use the definition of the derivative of a function)

6. Differentiate the following functions.

(a) $f(x) = 2x^3 + \ln(3x^2 + 2x) + 7 \cdot 6^x$

(b) $g(x) = (x^3 - 2x) + x^4 \ln x$

(c) $h(x) = \cos(x^2 - \ln x) + \frac{3}{\sqrt[3]{x}}$

(d) $l(x) = \frac{3e^x}{4x - 2}$

(e) $k(x) = (3x^2 - 2)^{25}$

7. Investing \$2000 at an annual rate of $r\%$, for 10 years gives you a balance of $\$B$, where $B = g(r)$. Give a financial interpretation of the statements:

(a) $g(4) = 3000$, (b) $g'(4) = 270$. Give the units of $g'(4)$.

Use the above information to estimate the balance 5 years after the initial deposit is made.