[54r]

S[t] James' Square
Friday Morning

Dear M[r] De Morgan. I
send you a large packet
of papers :
1 : Some Remarks & Queries on
the subjects of a portion of
pages 75 & 76 (Differential Calculus)
2 : an Abstract of the demonstration
of the Method of finding the
n^{th} Differential Co-efficient by
means of the Formula
Limit of $\frac{\Delta^n u}{(\Delta x)^n} = u^{(n)}$
[54v] 3 : Some objections & enquiries
on the subjects of pages 83,
84, 85. _
4 : Two enquiries on two
Formulae in page['s' crossed out] 35 of the
"Elementary Illustrations". __
In addition to all
this, I have a word to
say on two points in your
last letter.
Firstly : that θ is a function
of a & h, (or in all cases
a function of one at any
rate of these quantities), is
very clearly shown by you
in reply to my question.
But I still do not see exactly
[55r] the use & aim of this fact
being so particularly pointed
out in the parenthesis at the
top of page 80. It does
not appear to me that
the subsequent argument is
at all affected by it. __
Secondly : I still am not
satisfied about the Logarithms,
I mean about the peculiarity

which constitutes a Naperian
Logarithm in what I call
the Geometrical Method, _
the method in your
Number & Magnitude. I
am [‘now’ inserted] satisfied of the following :
that there is nothing in
the Geometrical Method to
[55v] lead to the precise determination
of ε ; _ that ε is arrived
at by other means, Algebraical
means ; & then identified
with the k on HL of the
Geometrical Method. What
constitutes a Naperian Logarithm
in the Geometrical view, is
“taking k so that x shall
“expound $1 + x$, or rather that
“the smaller x is, the more
“nearly shall x expound $1 + x$.
But in this definition there
are two points that are still
misty to me : I do not
see in what, (beyond the
mere fact itself), these
Logarithms differ from those
[56r] in which x does not
expound $1 + x$. I cannot
perceive how this one
peculiarity in them, involves
any others, or imparts to
them any particular use,
or simplicity, not belonging
to other logarithms. _
Also, I do not comprehend
the doubt implied as to
the absolute theoretical
strictly-mathematical existence
of a construction in which
x shall expound $1 + x$.
It appears to me that,
whether practically with a

pair of good compasses, or
theoretically with a pair of
[56v] mental compasses, I can as
easily as may be take any
[diagram in original]
line I please MQ greater than
OK or V, measure their difference
PQ which call x, then on
OH $(= OK)$ lay down a portion
OM equal to this difference x
(not that I pretend this is
correctly done in my figure,
which is only roughly inked
down at the moment), &
['finally' inserted] stick up MQ on the point
M. Then x expounds MQ or
[57r] $V + x$, or $1 + x$. I can see
no difficulty in accomplishing
this, or any reason why these
can be only an approximation
to it. Neither do I very
clearly perceive that the
Base k would be
necessarily influenced by this
proceeding. __
In short I take the real
truth to be that this view
of Exponents being wholly new
to me, there is some little
link which has escaped me,
or to which at any rate I
have not given it's [*sic*] due
importance. But I think
I have now fully explained
[57v] what it is that I do not
understand.
Believe me

Yours very truly

A. A. Lovelace