Dear Mr. De Morgan. Since dispatching my letter yesterday, I remember that I have not even quite fully & correctly stated the whole points of difference ['between' inserted] \(\int \sqrt{a^2 - x^2} \cdot x^n - dx\) and \(\int \sqrt{vd2u}.\). I think I stated that \(\int \sqrt{a^2 - x^2} \cdot x^n - dx = \int \sqrt{vd2u}.\frac{1}{x}\), that in other words the 1st side differs from \(\int \sqrt{vd2u}\) in containing a factor \((-\frac{1}{x})\). But it differs also in containing \(dx\) as well, which in writing yesterday I omitted I believe to notice. So that \(\int \sqrt{a^2 - x^2} \cdot x^n - dx = \int \sqrt{vd2u}.\frac{(-1)}{x}.dx\) or the 1st side differs from \(\int \sqrt{vd2u}\) in containing \(-\frac{1}{x}.dx\). Is not this what I ought to have stated? Or is there still any confusion?

I also wish to observe upon what I wrote on Friday as to the application of the Differential & Integral Calculus to \(\frac{a^2}{x}\). [110v] that I am aware this formula ['\(e = \frac{gt^2}{2}\)', inserted] can be derived from \(V = gt\), by the simple Theory of algebraical proportion; but that I was anxious to know how it is derived in the other way.

I will with your leave ['(which I do not wait for)'] inserted, send you my paper making it out on the doctrine of Proportions. __

You must tell me if I presume too much on your kindness to me. I am so engaged at present with my mathematical & scientific plans & pursuits that I can think of little else; & perhaps may be a plague & bore to my friends about [something crossed out] these subjects; for after my interruption from Paris & London pursuits & occupations, my whole heart is with my renewed studies; & every minutia even is a matter of the greatest interest.

Believe me
Yours most truly

A. A. Lovelace
You will receive two papers on \( e = \frac{gt^2}{2} \) tomorrow evening, or Wed\(^{dy} \). One of them is to show the absurdity of the supposition that the spaces might be as the velocities; ['& that' inserted] on merely abstract grounds it could not be.