NCEA Level 3 Calculus (Integration)
23. Trigonometric Substitution (Homework)

Reading

The movement of humanity, arising as it does from innumerable arbitrary human wills, is continuous.

To understand the laws of this continuous movement is the aim of history...

Only by taking infinitesimally small units for observation (the differential of history, that is, the individual tendencies of men) and attaining to the art of integrating them (that is, finding the sum of these infinitesimals) can we hope to arrive at the laws of history.

(Leo Tolstoy, *War and Peace*)

Extra reading: read `http://teachers.dadeschools.net/akoski/downloads/Reading_Journals/Essays/tolstoy_integration.pdf` (*Tolstoy's Integration Metaphor*, S. Ahearn, 2004.)

Questions

Compute the following integrals. Some may not require trig substitution.

1. $\displaystyle\int \frac{\mathrm{d}x}{\sqrt{x^2+4}}$
2. $\displaystyle\int \frac{x^6}{\sqrt{1-x^{14}}}$
3. $\displaystyle\int \sqrt{9-x^2}\,\mathrm{d}x$
4. $\displaystyle\int x\sqrt{25x^2-4}\,\mathrm{d}x$
5. $\displaystyle\int \sqrt{4-9z^2}\,\mathrm{d}z$
6. $\displaystyle\int_0^{1/6} \frac{x^5}{(36x^2+1)^{3/2}}\,\mathrm{d}x$
7. $\displaystyle\int \frac{\ln x}{x^5}\,\mathrm{d}x$
8. $\displaystyle\int_1^2 \frac{5t-2}{2t^2-t-1}\,\mathrm{d}t$