In-class exercise – Multiple Segment Trapezoidal Rule

The integral below is estimated using multiple-segment Trapezoidal rule

$$x = \int_{8}^{30} \left(2000 \ln \left[\frac{140000}{140000 - 2100t} \right] - 9.8t \right) dt$$

The estimated values and the associated true error are given in the table below.

n	Value	Et	
1	11868	-807	
2	11266	-205	
3	11153	-91.4	
4	11113	-51.5	
5	11094	-33.0	
6	11084	-22.9	
7	11078	-16.8	
8	11074	-12.9	

- a) For n=1, 2, 4, 8, divide the true error by 4 and put it in the 4th column. Do you see a trend?
- b) What is the true value of the integral?
- c) What is the relative true error for the estimate using n=8?
- d) What is the absolute approximate error for the estimate using n=8?
- e) In the fourth column, write the points where the function is calculated for estimate for n=1, 2, 3, 4. For example, for n=2, the points are t=8, 19, 30.
- f) How many significant digits can I trust for the estimate using n=8?