

Name _____

1. (10 points) Use the composite Simpson's Rule

$$\int_a^b f(x)dx \approx \frac{h}{3} \left(f(a) + 2 \sum_{k=1}^{\frac{r}{2}-1} f(t_{2k}) + 4 \sum_{k=1}^{\frac{r}{2}} f(t_{2k-1}) + f(b) \right)$$

to approximate $\int_0^4 3\sqrt{x}dx$ when $r = 2, 20, 200$ subintervals. Compare your approximate answers to the exact answer by writing the exact error in each case. Then use stabilization of digits to describe how this comparison fits with the error formula for composite Simpson's rule.

2. (10 points) A sample of R grams of radium decays into lead at the rate $R' = -\frac{R}{233}$ grams per year. Using RK2 with step sizes $\Delta t = 5, .5, .05, .005$ years, estimate how much radium remains in a 0.72 gram sample after 40 years. Use stabilizing of digits to describe order of the method RK2.