Business Calculus, MiniTest 4 Review Answers

Dr. Graham-Squire, Fall 2014

1. The element Grahamsquireium has a half-life of 250 years. Given a 100 gram sample, how much of it will be left after 300 years?

   Ans: 43.53 grams.

2. Find the indefinite integral $\int x\left(\sqrt{x}+\frac{3}{x^2}-\frac{2e^x}{x}\right)\,dx$.

   Ans: $\frac{2}{5}x^{5/2}+3\ln x-2e^x+C$ (Note: $\ln|x|$ is also correct)

3. Find the indefinite integrals:

   (a) $\int x^2(2x^3+3)^4\,dx$.

   Ans: $\frac{1}{30}(2x^3+3)^5+C$. Let $u=2x^3+3$.

   (b) $\int \frac{1}{x(\ln x)^2}\,dx$. Let $u=\ln x$.

   Ans: $-(\ln x)^{-1}+C$

4. (a) Use a Riemann sum to approximate the area under the graph of $f(x)=x^2-6x+10$ on the interval [1,3], using 8 subintervals and evaluating at the *right* endpoint.

   Ans: 4.1875

   (b) Estimate whether your answer from (a) is an overestimate or an underestimate of the actual area under the curve.

   Ans: Underestimate, since the rectangles end up underneath the curve.

   (c) Calculate the actual area under the graph.

   Ans: $\int_1^3(x^2-6x+10)\,dx=14/3\approx 4.67$

5. Find the definite integrals:

   (a) $\int_1^e \frac{x^3-x^2}{x^3},dx$.

   Ans: $e-2\approx 0.718$

   (b) $\int_4^9 \frac{3}{\sqrt{x}}\,dx$.

   Ans: 6