M250   Practice Exam 5.1-5.6
P. Staley

1. State the definition for ln(x):

2. State the definition for The exponential function, e^x:

Compute the following derivatives

3. $\dfrac{d}{dx}(e^x + e^{3x})^4$

4. $\dfrac{d}{dx}3^x x^3$

5. $\dfrac{d}{dx}\ln(5-x)^6$

6. $\dfrac{d}{dx}\ln\left(\dfrac{x^2\sqrt{4x+1}}{(x^3+5)^3}\right)$
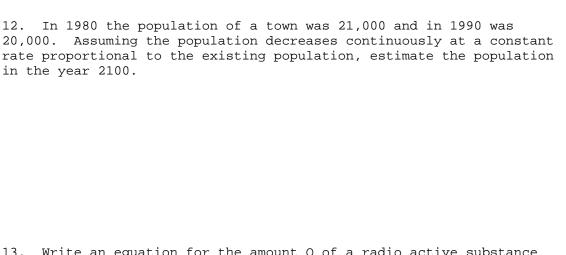
Compute the following integrals

7. $\displaystyle\int \dfrac{e^{\sqrt{t}}}{\sqrt{t}}\,dt$

8. $\displaystyle\int \dfrac{e^x}{e^x-2}\,dx$

9. $\int \dfrac{1}{x^2 e^{2/x}} \, dx$

10. $\int_{-1}^{2} \dfrac{x}{x^2 + 3} \, dx$

11. $\int_{0}^{3} 2x e^{x^2} \, dx$

12. In 1980 the population of a town was 21,000 and in 1990 was
20,000. Assuming the population decreases continuously at a constant
rate proportional to the existing population, estimate the population
in the year 2100.

13. Write an equation for the amount Q of a radio active substance
with a half-life of 30 days, if 10 grams are present when t=0.

14. The number of fruit flies increases according to the law of
exponential growth. If initially there are 10 fruit flies and after 6
hours there are 24, find the number fo fruit flies after t hours.