Calculus II
Practice Problems 1

1. Solve for x:

a) $6^x = 36^{2-x}$

b) $\ln_3 x = 5$

c) $\ln_2(x+1) - \ln_2(x-1) = \ln_2 8$

2. Find the derivative of the given function:

a) $y = \ln(\ln x)$

b) $y = \log_2(x^2+1)$

c) $y = \dfrac{e^{x^2}}{x}$

3. Solve: $\sqrt{\ln x} = \ln(\sqrt{x})$.

4. Find the integrals:

a) $\displaystyle\int \frac{(\ln x)^2 + 1}{x} dx =$

b) $\displaystyle\int e^{\sin x} \cos x dx =$

c) $\displaystyle\int \frac{x dx}{3x^2 + 1} =$

5. Solve the initial value problem $(x+1)y' = 2y$, $y(1) = 1$.

6. If $f(x) = 2\sqrt{x}\ln x$, find $f'(x)$.

7. I invest $100,000 in a company for five years, with a guaranteed income of 8% per year, compounded semi-annually. How much will I have at the end of 5 years? If the interest were compounded continuously, how much would I have in 5 years?

8. A certain element decays at a rate of .000163/year. Of a piece of this element of 450 kg, how much will remain in ten years?

9. Two variables are related by the equation $2\ln x + \ln y = x - y$. What is the equation of the tangent line to the graph of this relation at the point (1,1)?

10. If the region in the first quadrant bounded by the curve $y = e^x$ and $x = 1$ is rotated about the x axis, what is the volume of the resulting solid?