1. (a) Write the general forms of the Power Rule, Exponential Rule and Log Rule for derivatives.
(b) Write the general forms of the Power Rule, Exponential Rule and Log Rule for integrals.

Use the rules above to determine the following integrals. Do not use the substitution method.

2. $\int 8x^2(3 + 10x^2)(2x^3 + 4x^5)^6 \, dx$

3. $\int \frac{2x^2(3 + 10x^2)}{(2x^3 + 4x^5)} \, dx$

4. $\int (6x^2 + 20x^4)e^{(2x^3+4x^5)} \, dx$

5. Find the area between $f(x) = \frac{1}{x}$ and the x-axis for $x$ between $x = 1$ and $x = 4$. Show your work including your graph, differential area and limits. Give your answer to 4 decimal places.

6. Use logarithmic differentiation to find $f'(x)$ at $x = 1$ if $f(x) = (3x + 1)^x$. Give your answer to 4 decimal places.

7. Solve the following equation for $x$. Give your answer to 4 decimal places. Show your work.
$$\ln(5e^{2x}) + \ln(4e^{4x}) + \ln(1) \cdot (3x^5 + 4x^2 + 999) = \ln(100)$$

8. (a) How many years will it take $\$200$ to grow to $\$4,000$ if compounded quarterly and invested at 10% per year?
(b) Repeat if compounded continuously. Give your answers to 4 decimal places.