US5256 LESSON THREE: EXPONENTIAL AND LOGARITHMIC SERIES

1. Using $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots + \frac{x^n}{n!}$ calculate the values of e^2, e^5, e^{-7} and $e^{3.2}$ each to 3, 5 and 7 terms to four sf, and then check your answers using the e^x function on a calculator.

2. Write down the first five terms for each of:

   a. e^{3x}

   b. e^{-2x}

   c. $e^{½x}$

   d. $e^{-⅔x}$

   e. e^{x^3}

   f. $e^{2x} + e^x$

   g. $e^{¼x} + e^{-x}$

   h. $(2 + x)e^x$

   i. $(2x + 3)e^{3x}$

   j. $(2 - e^x)(e^x + 1)$

3. Simplify these log expressions:

   a. log(3) + log(4)

   b. log(36) - log(12)

   c. 3log(5)

   d. 4log(6) - log(18)

   e. ½log(9) - 4/3log(20)

4. For each expression, solve for x:

   a. $3^x = 20$

   b. $2.46^x = 6$

   c. $24^x = 540$

   d. $5^{2x} = 32$

   e. $0.73^{4x} = 9$

   f. $4.5^{x+3} = 35$

   g. $21 \times 63^{x-4} = 80$

5. Express the following terms as their surd roots, eg $45 = 1.886^6$.

   a. 32

   b. 21

   c. 73

   d. 17

   e. 42

6. Using $ln(1 + x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots \frac{x^n}{n}$, calculate the natural logarithms for the following expressions, to each of three, five and seven terms, and compare your result with the calculator function:

   a. 23

   b. 11

   c. 81

   d. $¾^4$

   e. $\sqrt{3}$

   f. $(\sqrt[4]{4})^3$