Assessment 1 **Time allowed 45 minutes (ish)**

NAME: .... DEPT: ....
REG. NUMBER:..... TUTORIAL:.....

For all questions show all working and carefully state any facts or properties you use.

1. Expand $(1+x)^{10}$ up to the term in x^2.

2. Find the sum of the first 10 terms in the geometric sequence $\{5, 10, 20, 40, \ldots\}$. With the usual notation, the sum of the first n terms of a geometric series is given by $S_n = \dfrac{a(r^n - 1)}{r - 1}$

3. Express $\dfrac{x-7}{(x+1)(x-3)}$ in terms of partial fractions.

4. Reduce to a single ln term : (a) $\ln(x^4y) - \ln x - 4\ln y$ (*b*) $3\ln(x-4) - 2\ln(x-7)$.

5. Sketch the graph of $y = 4e^{-t}$ for $t \geq 0$. Express t in terms of y.

6. Let $x = e^{4t}$ and $y = e^{2t}$. Simplify $z = \ln(x/y)$.

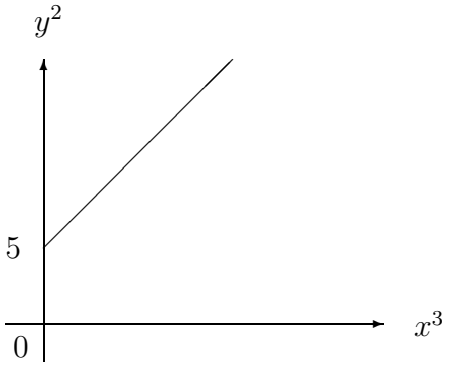
7. Let $y = e^{3t}$. Express y in terms of x when

$$(a) \quad t = \ln x + \ln 4\,, \qquad (b) \quad t = -2\ln x + 1$$

8. Show that $e^{4x}(1 + e^{-4x})^2 = 2 + 2\cosh 4x$.

9. Show that $1 + 2\sinh^2 x = \cosh 2x$

10. As shown below, a set of experimental results gives a straight line graph when y^2 is plotted against x^3. The straight line has gradient 2 and passes through $(0, 5)$. Express y in terms of x.



END OF TEST

ROUGH WORKING