1. (i) Expand $(1 + ax)^{-4}$ in ascending powers of x, up to and including the term in x^2. [3]

   (ii) The coefficients of x and x^2 in the expansion of $(1 + bx)(1 + ax)^{-4}$ are 1 and -2 respectively. Given that $a > 0$, find the values of a and b. [5]

2. Find the first three terms in the expansion of $(9 - 16x)^{\frac{3}{2}}$ in ascending powers of x, and state the set of values for which this expansion is valid. **[5]**

3. (i) Expand $(1 + 2x)^{\frac{1}{2}}$ as a series in ascending powers of x, up to and including the term in x^3. **[3]**

   (ii) Hence find the expansion of $\dfrac{(1+2x)^{\frac{1}{2}}}{(1+x)^3}$ as a series in ascending powers of x, up to and including the term in x^3. **[5]**

   (iii) State the set of values of x for which the expansion in part **(ii)** is valid. **[1]**

4. (i) Expand $(1 - x)^{\frac{1}{2}}$ in ascending powers of x as far as the term in x^2. **[3]**

   (ii) Hence expand $\left(1 - 2y + 4y^2\right)^{\frac{1}{2}}$ in ascending powers of y as far as the term in y^2. **[3]**

5. (i) Expand $(1 + x)^{\frac{1}{3}}$ in ascending powers of x, up to and including the term in x^2. **[2]**

   (ii) (a) Hence, or otherwise, expand $(8 + 16x)^{\frac{1}{3}}$ in ascending powers of x, up to and including the term in x^2. **[4]**

   (b) State the set of values of x for which the expansion in part **(ii) (a)** is valid. **[1]**

① i) $1 - 4ax + 10a^2x^2$ ii) $a = \frac{1}{3}$ $b = \frac{7}{3}$

② $1 - \frac{8}{3}x + \frac{32}{27}x^2$

③ i) $1 + x - \frac{1}{2}x^2 + \frac{1}{2}x^3$ ii) $1 - 2x + \frac{5}{2}x^2 - 2x^3$ iii) $|x| < \frac{1}{2}$

④ i) $1 - \frac{1}{2}x - \frac{1}{8}x^2$ ii) $1 - y + \frac{3}{2}y^2$

⑤ i) $1 + \frac{1}{3}x - \frac{1}{9}x^2$ ii) a) $2 + \frac{4}{3}x - \frac{8}{9}x^2$ b) $|x| < \frac{1}{2}$