Core 4 Binomial Questions

5 (a) (i) Obtain the binomial expansion of $(1-x)^{-1}$ up to and including the term in x^2.

(2 marks)

(ii) Hence, or otherwise, show that

$$\frac{1}{3-2x} \approx \frac{1}{3} + \frac{2}{9}x + \frac{4}{27}x^2$$

for small values of x. *(3 marks)*

(b) Obtain the binomial expansion of $\frac{1}{(1-x)^2}$ up to and including the term in x^2.

(2 marks)

(c) Given that $\frac{2x^2-3}{(3-2x)(1-x)^2}$ can be written in the form $\frac{A}{(3-2x)} + \frac{B}{(1-x)} + \frac{C}{(1-x)^2}$, find the values of A, B and C.

(5 marks)

(d) Hence find the binomial expansion of $\frac{2x^2-3}{(3-2x)(1-x)^2}$ up to and including the term in x^2.

(3 marks)

---

2 (a) Obtain the binomial expansion of $(1-x)^{-3}$ up to and including the term in x^2.

(2 marks)

(b) Hence obtain the binomial expansion of $\left(1-\frac{5}{2}x\right)^{-3}$ up to and including the term in x^2.

(2 marks)

(c) Find the range of values of x for which the binomial expansion of $\left(1-\frac{5}{2}x\right)^{-3}$ would be valid.

(2 marks)

(d) Given that x is small, show that $\left(\frac{4}{2-5x}\right)^3 \approx a + bx + cx^2$, where a, b and c are integers.

(2 marks)

---

5 (a) Find the binomial expansion of $(1+x)^{\frac{1}{3}}$ up to the term in x^2. *(2 marks)*

(b) (i) Show that $(8+3x)^{\frac{1}{3}} \approx 2+\frac{1}{4}x-\frac{1}{32}x^2$ for small values of x. *(3 marks)*

(ii) Hence show that $\sqrt[3]{9} \approx \frac{599}{288}$. *(2 marks)*

---

2 (a) (i) Find the binomial expansion of $(1+x)^{-1}$ up to the term in x^3. *(2 marks)*

(ii) Hence, or otherwise, obtain the binomial expansion of $\frac{1}{1+3x}$ up to the term in x^3. *(2 marks)*

(b) Express $\frac{1+4x}{(1+x)(1+3x)}$ in partial fractions. *(3 marks)*

(c) (i) Find the binomial expansion of $\frac{1+4x}{(1+x)(1+3x)}$ up to the term in x^3. *(3 marks)*

(ii) Find the range of values of x for which the binomial expansion of $\frac{1+4x}{(1+x)(1+3x)}$ is valid. *(2 marks)*
