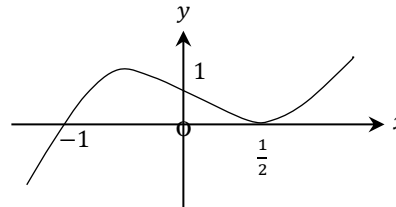**Advanced Pure Mathematics – Answers**

1.   (a) $x^{-3} - 12x^{-\frac{3}{2}} + 60 + \cdots$ (b) $x = \frac{3}{2}, y = \frac{4}{3}$ or $x = 2, y = 1$
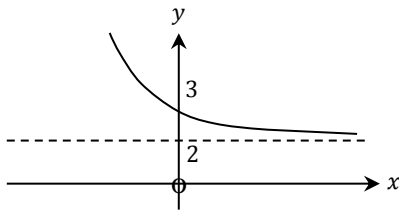
2.   (a) $(x+1)(2x-1)(2x-1)$ (b)

(c) $x < -1$

3.   (b) 6

4.   (b) $(-2,5)$ (c) $(x+2)^2 + (y-5)^2 = 13$

5.   (a)

$f(x) \in R, \ f(x) > 2$

(b) $f^{-1}(x) = -\frac{1}{3}\ln(x-2); \ dom \ f^{-1}: x \in R, x > 2; \ range \ f^{-1}: f^{-1}(x) \in R$

6.   (a) (ii) $\pm\frac{\pi}{3}, \pm\frac{5\pi}{3}$ (b) $a = 6, b = 3, c = 2$

7.   (a) (i) $-\frac{7}{(3x+2)(2x-1)}$ (ii) $\frac{2(\cos 2x - y^2)}{y(3y+4x)}$ (b) (ii) $\frac{2(1-t)^3}{3(1-2t)^3}$

8.   (a) (i) $-\frac{3}{7}; \frac{6}{7}$ (iii) 32

(b) (i) $x - 1$ (ii) $0 < x < 2$ (iii) $\frac{3}{2}$

9.   (a) (i) $\frac{2}{3}(\sqrt{2}-1)$ (ii) $\frac{x^6}{36}(6\ln x - 1) + k$

(b) $-\frac{1}{2x+1} + \frac{x}{x^2+5}; \ y^2 = \ln\left|\frac{x^2+5}{2(2x+1)}\right| + 9$

10. (b) (i)(ii) $(0,4)$ inflexion; $(2,-12)$ minimum   (iii)