



# Max and Min Turning Points



1. Find the turning point of the function  $f(x) = 2x^2 - 8x + 7$  and show that it is a local minimum.
2. Find and classify the turning points of  $y = x^3 + 3x^2 - 24x + 11$ .
3. Find and classify the coordinates of the turning points of each of the following curves;
  - (a)  $f(x) = 2x^3 - 9x^2 + 12x - 3$
  - (b)  $y = xe^x$
  - (c)  $y = \frac{3x^2}{x+3}$
4. Find and classify the coordinates of the turning points of the function  $f(x) = 5x + \frac{20}{x}$
5. Find and classify the coordinates of the stationary points of  $y = x^2 + \frac{1}{x^2}$
6. What is the coordinates and nature of the critical point of  $y = 5x - 5\sqrt{x}$
7. A function is defined by  $f(x) = 2 \ln(x) - 9x^2, x > 0$ 
  - (a) What is the slope of the tangent when  $x = 1$ ?
  - (b) Find and classify the coordinates of the turning point of the function.
8. Find and classify the turning point of the function  $y = \ln(5x^2) + 2x$ .
9. Find and classify the turning points of the function  $f(x) = x^2e^{2x}$
10. Find the turning points of the curve  $y = (x^2 - 10x + 25)e^{\frac{2x}{5}}$  and state which point is the local max and local min.
11. A function is defined by  $f(x) = -xe^{-kx}, x \in R$   $k$  a constant and  $k > 0$ . Find and classify the turning point in terms of  $k$ .
12. A function is defined as  $f(x) = \sin(3x)e^{-3x}$ , where  $0 \leq x \leq \pi$ . Find and classify the turning point of the function.
13. The function  $y = ax^3 + bx^2 + cx + d$  has a turning point at  $(-6, 256)$  and  $(2, 0)$ .  
Find the values of  $a, b$  and  $c$  and  $d$





14. The function  $y = px + \frac{q}{x}$  has a minimum turning point at  $(\frac{1}{2}, 16)$
- Find the values of  $p$ , and  $q$ .
  - Hence find the co-ordinates of the other turning point.
15. Find the coordinates of the point of inflection of each of the following curves:
- $y = 2x^3 - 3x^2 - 12x + 30$
  - $y = 15 - 12x + 9x^2 - x^3$
16. Calculate the point of inflection of the function  $f(x) = x^2 + \frac{1}{x}$ .
17. Find the point of inflection of the function  $y = \sqrt{x} + \frac{1}{\sqrt{x}}$
18. The function  $f(x) = ax^3 + bx^2 + cx + d$  has a minimum point at  $(2, -8)$  and a point of inflection at  $(-1, 46)$ .
- Find the values of  $a, b, c$  and  $d$ .
19. The function  $f(x) = e^x(ax^2 + bx)$  has a turning point at  $(-3, \frac{9}{e^3})$ . Find the value of  $a$  and the value of  $b$ .
20. Show that the function  $f(x) = \frac{3x + 1}{2x - 1}$  has no points of inflection.
21. A function is defined by  $y = x^3 - 6kx^2 + 32$ , where  $k$  is a constant.
- Show that one of the turning points is independent of  $k$ .
  - Find the value of  $k$  for which the function has only one real root.

