Turning Points

1 Turning Points

1. Find and classify the turning point of each of the following functions:
   - (a) $y = x^2 + 6x - 3$
   - (b) $f(x) = x^2 - 2x + 3$
   - (c) $y = x^2 + 4x + 4$
   - (d) $f(x) = 3x^2 + 12x - 4$
   - (e) $f(x) = 2x^2 - 8x + 7$
   - (f) $y = 15 - 2x - x^2$
   - (g) $f(x) = 10x - x^2$
   - (h) $y = 1 + 12x - 3x^2$
   - (i) $f(x) = 2x^2 - 6x + 4$

2. Find and classify the turning points of the following funcitons:
   - (a) $f(x) = x^3 + 3x^2 - 9x + 5$
   - (b) $f(x) = 2x^3 - 9x^2 + 12x - 3$
   - (c) $y = 2x^3 - 24x$
   - (d) $y = x^3 + 6x^2 + 9x + 3$
   - (e) $f(x) = x^3 - 3x^2 - 24x + 2$
   - (f) $y = 10 - 12x + 9x^2 - 2x^3$
   - (g) $y = 10 + 9x + 3x^2 - x^3$
   - (h) $f(x) = 15 + 36x + 3x^2 - 2x^3$

2 Increasing and Decreasing Functions

1. For what range of values are the following functions increasing?
   - (a) $y = x^2 - 4x + 2$
   - (b) $y = 3x^2 + 18x - 7$
   - (c) $f(x) = 15 - 2x - x^2$
   - (d) $y = 9x - 2x^2$

2. For what range of values are the following functions decreasing?

   (a) $y = x^2 - 6x + 5$

   (b) $f(x) = 2x^2 + 14x - 7$

   (c) $f(x) = 8x - x^2$

   (d) $y = 8 + 19x - 3x^2$

3. Consider the function $f(x) = x^3 - 3x^2 - 24x + 2$. Is this function increasing or decreasing when $x = 1$?

4. Consider the function $f(x) = x^3 + 5x^2 + 6x - 2$. Is this function increasing or decreasing when $x = 3$?

5. Consider the function $f(x) = 2x^3 - 13x^2 + 4x$. Is this function increasing or decreasing when $x = -1$?

6. Consider the function $f(x) = 5 - 2x^2 - 3x^3$. Is this function increasing or decreasing when $x = -2$?

7. Find and classify the turning points of the function $f(x) = x^3 + 3x^2 - 9x + 5$. Hence, find the range of values for where the function is decreasing.

8. Find and classify the turning points of the function $f(x) = 2x^3 - 9x^2 + 12x - 3$. Hence, find the range of values for where the function is decreasing.

9. Find and classify the turning points of the function $f(x) = 15 + 36x + 3x^2 - 2x^3$. Hence, find the range of values for where the function is increasing.