

Give algebraic justification for all of your solutions. That is to say, you are not allowed to just reference what the graph looks like using graphing software.

1. Find the exact x -values of any turning points and the exact x -values of any points of inflection for the graph of $f(x) = x^2 - \frac{3}{x}$. **[10 marks]**

2. Let $f(x) = \frac{x^2}{x^3+1}$.

Determine the exact location of any turning points. Use the second derivative to classify these turning points as local minimums or local maximum. **[10 marks]**

3. Let $f(x) = \frac{(x+a)^2}{x-1}$ where a is a constant and $a \neq -1$. (Note if $a = -1$, then $f(x)$ is a line with a hole) **[10 marks]**

- a) Show that $f(x)$ has no points of inflection.
b) On what interval(s) of x is the graph concave up?