A few notes on the sign pattern.

The sign pattern: Please work through the problems in your Study guide . The SG is under study material on myUnisa.
Very important:
1. Always put in your sign table those functions which **change signs** or are **always negative**.
2. Remember to include the values in your sign pattern where you have **division by zero**.
3. Always work with **positive powers of** x and put on a common denominator (to be able to do the problem) and find the correct sign pattern. For example for $f(x) = x + 1/x$,

$$f^{'}(x) = 1 - 1/x^2 = \frac{x^2 - 1}{x^2}$$

Then you have to follow the rules for the parabolas (see B below).
Also, **never use the form** $f^{'}(x) = 1 - x^{-2}$ in your sign pattern since you cannot make any deductions from this.
You will get a mark for the derivative but 0 for the sign pattern.

A. Now **straight lines** have the form $y = mx + c$.
If you have a straight line draw the line (rough work if you must).
The point where it cuts the $x - axis$ (i.e. where $y = 0$) is the point which must be included in your sign pattern.
If $y = mx + c, m > 0$ then to right of this cutting point the y values are positive and to the left the y values are negative.
For example the line $y = 3x + 3$ cuts the $x - axis$ at -1 so to the right of -1 the y values are positive and to the left of -1 the y values are negative.
For $y = mx + c$, $m < 0$ for example $y = -3x + 3$ we have that that this line cuts the $x - axis$ at $x = 1$ so to the right of 1 we have that the y values are negative and to the left the y values are positive (just the other way round as previous example).

B. Draw your **parabola** (rough work if you must):
Parabolas have a form $y = ax^2 + bx + c$. So you need to factorize them i.e. $y = 2x^2 + 5x - 3 = (2x - 1)(x + 3)$.
Then you work with these two straight lines separately in your sign pattern as in A.
For parabolas without real roots we have $(b^2 - ac) < 0$.
Thus the parabola cannot be factorize and never cuts the $x - axis$.
For example for $y = x^2 + 4$ we have $b = 0$ and $b^2 - 4ac = -4.1.4 = -16 < 0$.

So $y = x^2 + 4$ cannot be factorize and never cuts the $x - axis$.
It is **always positive (**since $a > 0$) and you
don't need to include this parabola in your sign pattern.
For the parabola $y = -2x^2 + 2x - 1$ we also have
$b^2 - 4ac = 4 - 4(-2)(-1) = -4 < 0$, it cannot be factorized and
never cuts the $x - axis$ but since a is **negative** we have a parabola
which is always negative and it **needs to be included in the sign pattern.**

C. You have also seen in the **example assignment 1** attached in
additional resources how we had worked with lnx.

D. What if we have the inverse of lnx i.e e^x in your given function?
The first very important fact is that $y = e^x$ is **ALWAYS positive**
no matter what the values of x are.
For example the function $f\ (x) = \frac{3x}{e^x}$ has a derivative

$$f^{'}(x) = \frac{3e^x - 3xe^x}{e^{2x}} = \frac{3e^x(1-x)}{e^{2x}} = \frac{3(1-x)}{e^x}$$

after simplification. [Don't write for instance e^{-x} since we don't
want negative powers.The derivative will still be correct with
negative powers but the deductions cannot be made from such
an equation.]
Here you **only** need to include $y = 1 - x$ in the sign pattern.
Why? because bothe 3 and e^x are always positive and you
may leave them out of the sign pattern.