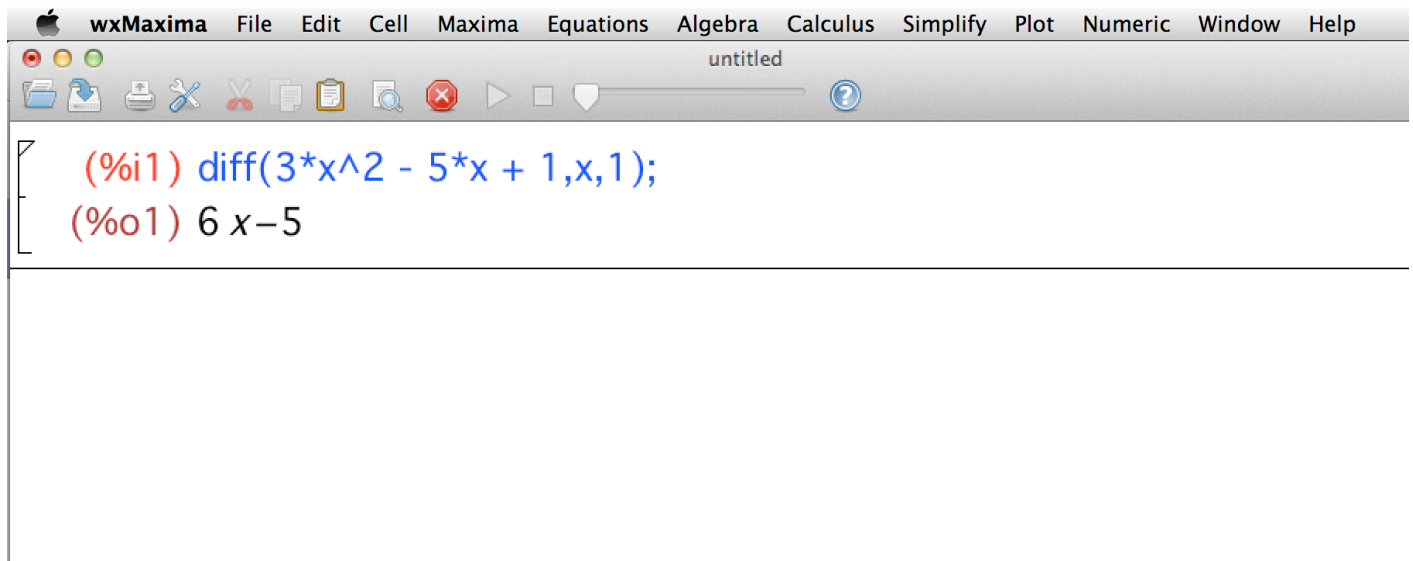


Examples of Using WxMaxima to Find and Simplify Derivatives (like we do in class)

For each example, I assume you have started the WxMaxima program on your computer. Then just use the “Calculus” menu at the top of the page and select “Differentiate” and type in the function like I did in the screen print.

Example 1: Find the derivative of $y = 3x^2 - 5x + 1$:

(in this example the answer is already simplified, so you don't have to do anything else).

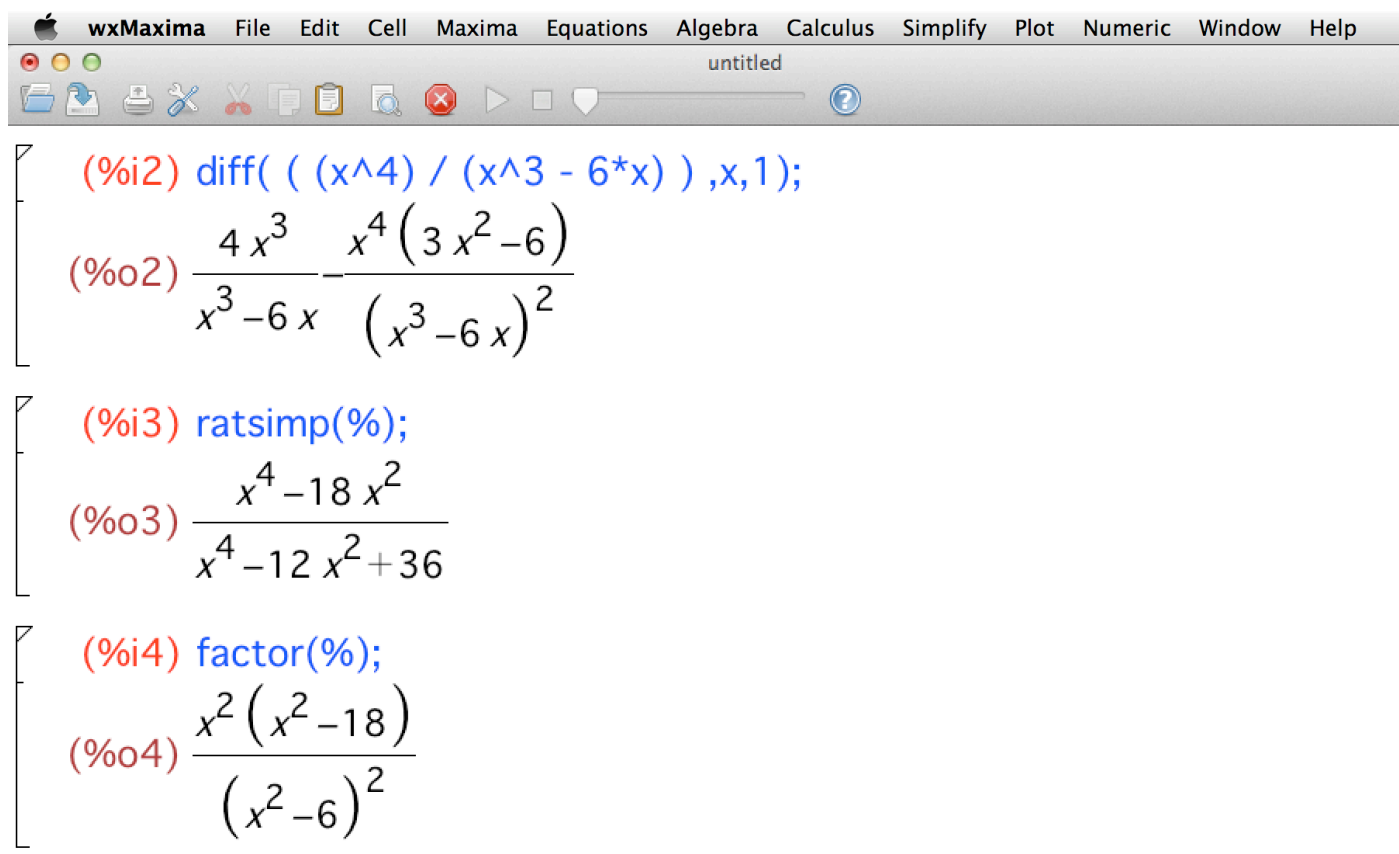


The screenshot shows the WxMaxima application window. The title bar reads "wxMaxima" and the menu bar includes "File", "Edit", "Cell", "Maxima", "Equations", "Algebra", "Calculus", "Simplify", "Plot", "Numeric", "Window", and "Help". The toolbar contains various icons for file operations and execution. The main text area shows the following input and output:

```
(%i1) diff(3*x^2 - 5*x + 1,x,1);  
(%o1) 6 x-5
```

Example 2:

$$y = \sqrt{\frac{x^4}{x^3 - 6x}}$$



```
wxMaxima File Edit Cell Maxima Equations Algebra Calculus Simplify Plot Numeric Window Help
untitled
(%i2) diff( ( (x^4) / (x^3 - 6*x) ) ,x,1);
(%o2) 
$$\frac{4x^3}{x^3 - 6x} - \frac{x^4(3x^2 - 6)}{(x^3 - 6x)^2}$$

(%i3) ratsimp(%);
(%o3) 
$$\frac{x^4 - 18x^2}{x^4 - 12x^2 + 36}$$

(%i4) factor(%);
(%o4) 
$$\frac{x^2(x^2 - 18)}{(x^2 - 6)^2}$$

```

Example 3: $y = \frac{\sqrt{3x}}{(x^5 - 4)^7}$

```

wxMaxima File Edit Cell Maxima Equations Algebra Calculus Simplify Plot Numeric Window Help
untitled
(%i1) diff( (3*x)^(1/2) / (x^5 - 4)^7, x, 1);
(%o1)  $\frac{\sqrt{3}}{2\sqrt{x}(x^5-4)^7} - \frac{35\sqrt{3}x^{9/2}}{(x^5-4)^8}$ 
(%i2) ratsimp(%);
(%o2)  $-(23 \cdot 3^{3/2} x^5 + 4\sqrt{3}) / (\sqrt{x}(2x^{40} - 64x^{35} + 896x^{30} - 7168x^{25} + 35840x^{20} - 114688x^{15} + 229376x^{10} - 262144x^5 + 131072))$ 
(%i3) factor(%);
(%o3)  $-\frac{\sqrt{3}(69x^5 + 4)}{2\sqrt{x}(x^5 - 4)^8}$ 

```

Notice that, in this problem, WxMaxima does not choose to rationalize the denominator, which some people and some calculators and some computers might do. If it had, then another correct way to write the simplified answer would be like this:

$$-\frac{\sqrt{3x} (69 * x^5 + 4)}{2x * (x^5 - 4)^8}$$

Example 4: $\sqrt[3]{\frac{x^2}{5x-1}}$

```

(%i1) diff(( x^2 / (5*x - 1) )^(1/3),x,1);
(%o1)  $\frac{2}{3 x^{1/3} (5 x-1)^{1/3}} - \frac{5 x^{2/3}}{3 (5 x-1)^{4/3}}$ 

(%i2) ratsimp(%);
(%o2)  $\frac{5 x-2}{x^{1/3} (5 x-1)^{1/3} (15 x-3)}$ 

(%i3) factor(%);
(%o3)  $\frac{5 x-2}{3 x^{1/3} (5 x-1)^{4/3}}$ 

```

Notice that WxMaxima doesn't know about our politeness policy in writing you answer using radicals if the problem was stated with radicals, so that extra step gives this:

$$\frac{5x-2}{3 \sqrt[3]{x} \sqrt[3]{(5x-1)^4}} \quad \text{or this} \quad \frac{5x-2}{3 (5x-1) \sqrt[3]{x(5x-1)}}$$

(if you simplify the radical)