

Exponentials, Logarithms, and Their Derivatives

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Objective

To compare the behavior of various exponential and logarithmic functions, and their derivatives.

Narrative

In this project you will differentiate and use the **Plot** command to plot several exponential and logarithmic functions on one set of coordinate axes.

Tasks

1. Type the command lines below into Mathematica in the order in which they are listed. These commands produce graphs of various exponential and logarithmic functions, and their derivatives.

```
In[1] := (* Your name, today's date *)
In[2] := (* Exponentials, Logarithms, and Their Derivatives *)
In[3] := f[x_] := Sin[x]+Log[x]
In[4] := f'[x]
In[5] := Plot[{f[x],f'[x]}, {x,-10,10}]
In[6] := f[x_] := Log[x^2+x+1]
In[7] := f'[x]
In[8] := Plot[{f[x], f'[x]}, {x,-10,10}]
In[9] := f[x_] := Log[2x+x*Sin[x]]
In[10] := f'[x]
In[11] := f''[x]
In[12] := Plot[{f[x], f'[x], f''[x]}, {x,-10,10}]
In[13] := f[x_] := Exp[Sin[5x]]
In[14] := f'[x]
In[15] := f''[x]
In[16] := Plot[{f[x], f'[x], f''[x]}, {x,-2,2}]
In[17] := f[x_] := Exp[x]/(1+x)
In[18] := f'[x]
In[19] := f''[x]
In[20] := Plot[{f[x], f'[x], f''[x]}, {x,-5,5}]
```

At this time, make a hard copy of your typed input and Mathematica's responses. Then:

2. Label by hand each of the curves — both the original functions and the derivatives — in each of the graphics you created in Task 1.

Your lab report will be a hard-copy of your typed input and Mathematica's responses (both text and hand-drawn graphics).