

# PHYS 361: Basic Syntax Assignment

## Problem 1:

Open your own live script and perform the following computations.

a)  $\frac{22 + 5.1^2}{50 - 6.3}$

b)  $\frac{44}{7} + \frac{8^2}{5} + \frac{99}{3.9^2}$

c)  $\frac{\sqrt{41^2 - 5.2^2}}{e^2 - 100.52}$

d)  $\sqrt[3]{132} + \frac{\ln(500)}{8}$

e)  $\cos\left(\frac{7\pi}{9}\right) + \tan\left(\frac{7\pi}{15}\right)\sin(15^\circ)$

Define the variables,  $a=12$ ,  $b=5.6$ ,  $c = \frac{3a}{b^2}$ , and  $d = \frac{(a-b)^c}{c}$ , and evaluate:

f)  $\frac{a}{b} + \frac{d-c}{d+c} - (d-b)^2$

g)  $e^{\frac{d-c}{a-2b}} + \ln\left(\left|c-d+\frac{b}{a}\right|\right)$

## Problem 2:

The formula for changing the base of a logarithm is:

$$\log_a N = \frac{\log_b N}{\log_b a}$$

1. Use MATLAB's function  $\log(x)$  to calculate  $\log_4(0.085)$ .

2. Use MATLAB's function `log10(x)` to calculate  $\log_6(1500)$ .

### Problem 3:

According to special relativity, a rod of length  $L$  moving at a velocity  $v$  will shorten by an amount  $\delta$ , according to the formula:

$$\delta = L \left( 1 - \sqrt{1 - \frac{v^2}{c^2}} \right),$$

where  $c$  is the speed of light. Calculate how much a rod that is 2 m long will contract when traveling at 5,000 m/s.

### Optional Advanced Exercises:

#### Exercise 1: Using advanced features in the live script.

Use the Help documentation to learn how to use the slider option under Control in the toolbar. Next, add a slider to your code for problem 4, allowing the user to change the speed of the rod using the slider.