

PHYS 361: Basic Syntax Assignment

Problem 1:

Open your own live script and perform the following computations.

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

```
(22 + 5.1^2)/(50 - 6.3)
```

```
ans = 1.0986
```

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

```
(44 / 7) + ((8^2) / 5) + (99 / (3.9^2))
```

```
ans = 25.5946
```

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

```
sqrt((41^2) - (5.2^2)) / ((exp(1)^2) - 100.52)
```

```
ans = -0.4367
```

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

```
nthroot(132, 3) + (log(500) / 8)
```

```
ans = 5.8685
```

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

```
cos(7*pi/9) + tan(7*pi/15)*sind(15)
```

```
ans = 1.6965
```

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

```
a = 12;  
b = 5.6;
```

```
c = 3*a/(b^2);
d = ((a - b)^c) / c;

f = (a/b) + ((d-c)/(d+c)) - (d-b)^2

f = -0.1459
```

```
g = exp(1)^((d-c)/(a-2*b)) + log(abs(c - d + (b/a)))

g = 2.2925e+03
```

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 $\log_{10}(x)$ to calculate $\log_6(1500)$.

```
log(0.085) / log(4)
```

```
ans = -1.7782
```

```
log10(0.085) / log10(4)
```

```
ans = -1.7782
```

Problem 3:

According to special relativity, a rod of length L moving at a velocity v will shorten by an amount δ , 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.

```
v = 210051000;

2*(1 - sqrt(1 - (v^2)/((3e8)^2)))
```

```
ans = 0.5720
```

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.