HUM107 - Introduction To Engineering – Tutorial - 01

Q1	**Calculate:** (a) $\dfrac{\sqrt{41^2-5.2^2}}{e^5-100.53}$ (b) $\sqrt[3]{132}+\dfrac{\ln(500)}{8}$

Sol 1	Script file:
	`clear, clc`
	`disp('Part (a)')`
	`sqrt(41^2-5.2^2)/(exp(5)-100.53)`
	`disp('Part (b)')`
	`%alternative: nthroot(132,3)+log(500)/8`
	`132^(1/3)+log(500)/8`
	
	Command Window:
	`Part (a)`
	`ans =`
	`0.8493`
	`Part (b)`
	`ans =`
	`5.8685`

Q2	**Calculate:** (a) $\cos\left(\frac{7\pi}{9}\right) + \tan\left(\frac{7}{15}\pi\right)\sin(15°)$

Sol 2	Script file:
	`clear, clc`
	`disp('Part (a)')`
	`%alternative: sin(15*pi/180) instead of sind(15)`
	`cos(7*pi/9)+tan(7*pi/15)*sind(15)`
	Command Window:
	`Part (a)`
	`ans =`
	`1.6965`

Q 3

Define the variables a, b, c, and d as:

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

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

So l 3

Script file:

```
clear, clc
disp('Part (b)')
exp((d-c)/(a-2*b))+log(abs(c-d+b/a))
```

Command Window:

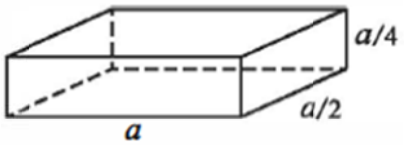
```
Part (b)
ans =
   2.2925e+03
```

Q 4

A sphere has a radius of 24 cm. A rectangular prism has sides of a, $a/2$, and $a/4$.

(*a*) Determine a of a prism that has the same volume as the sphere.

(*b*) Determine a of a prism that has the same surface area as the sphere.



Sol 4

Script file:

```
clear, clc
r=24;
disp('Part (a)')
%need to solve (a)(a/2)(a/4)=4/3 pi r^3
%could also use ^(1/3)
a=nthroot(8*4/3*pi*r^3,3)
disp('Part (b)')
%need to solve 2(a^2/2+a^2/4+a^2/8)=4 pi r^2
a=sqrt(8/7*4*pi*r^2)
disp(' ')
```

Command Window:

```
Part (a)
a =
   77.3756
Part (b)
a =
   90.9520
```

Q5

Two trigonometric identities are given by:

(*b*) $\sin^2 x \cos^2 x = \dfrac{1-\cos 4x}{8}$ $\quad 16\sin^5 x$

For each part, verify that the identity is correct by calculating the values of th left and right sides of the equation, substituting $x = \dfrac{\pi}{12}$.

Two trigonometric identities are given by:

(*b*) $\cos 4x = 8(\cos^4 x - \cos^2 x) + 1$

For each part, verify that the identity is correct by calculating the values of th left and right sides of the equation, substituting $x = 24°$.

Sol 5

Script file:

```
clear, clc
x=pi/12;
disp('Part (b)')
LHS = sin(x)^2*cos(x)^2
RHS = (1-cos(4*x))/8
```

Command Window:

```
Part (b)
LHS =
    0.0625
RHS =
    0.0625
```

```
disp('Part (b)')
LHS = cosd(4*x)
RHS = 8*(cosd(x)^4-cosd(x)^2)+1

Part (b)
LHS =
   -0.1045
RHS =
   -0.1045
```