Laboratory 1

1. Evaluate $(1+x)^2$, $(1+x)^{10}$, $(1+x)^{20}$, $(1+x)^{30}$, $(1+x)^{100}$. Figure out what the coefficients mean.

2. Evaluate $(x+y+z)^{10}$, $(x+y+z)^{20}$. Figure out what the coefficients mean.

3. Write maple statements or expressions to compute the following:
   See what happens.

   (a) #this is an integer
   $exp(I * Pi)$;

   (b) #question: Are the following numbers rational or real numbers?
   # How does one prove this?
   #this is a floating point number
   $exp(Pi)$;
   $evalf(exp(Pi))$;

   (c) $(Pi\hat{}e)$;
   $(Pi\hat{}E)$;
   $evalf(Pi\hat{}E)$;

   (d) $evalf(Pi + E)$;

   (e) $evalf(Pi - E)$;

   (f) $sqrt(2) + Pi$;
   $evalf(")$;
   $sqrt(2) - Pi$;
   $evalf(")$;

   (g) $sqrt(2)\hat{}sqrt(2)$
   $evalf(")$;

   (h) $log(5)$;
   $evalf(")$;
   $log10(5)$;
   $evalf(")$;

$log10(E)$;
$evalf(")$;
#what is the relation between the three answers?

(i) #calculating the digits of Pi, E and sqrt(2)
#how does one compute these digits;
$n := 100$;
$evalf(Pi, n)$;
$evalf(E, n)$
$evalf(sqrt(2), n)$;
$n := 1000$
#can you make a guess which numbers occur more frequently in these digits.
#Repeat the above calculations.

(j) $sum(i, i = 1..n)$;
#we will reset n to represent symbol n rather than the value 1000
$n :=' n'$;
$sum(i, i = 1..n)$;

(k) $sum(2 * i + 1, i = 1..n)$;

(l) #generate 10 throws of dices.
$die := rand(1..6)$;
$for\ i\ from\ 1\ to\ 10\ do$
$print(die())$;
od;

(m) calculate the area of a circle of radius 2.

(n) #For these two equations, find whether they have one or no solution.
#do this by plotting the equations.
$y = 3 * x + 4$
$y = x + 2$

#you may use ?solve to get a hint.

(o) Find a general formula for the last nonzero digit of n!.