> Math 418 : MAPLE Solution of Assignment #1 -- Your NAME

Problem 4(a): Converting numbers to binary form

```
> a := convert(654321, binary);
```

$$a := 10011111101111110001 \quad \textbf{(1)}$$

```
> b := convert(654321, base, 2);
```

$$b := [1, 0, 0, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1] \quad \textbf{(2)}$$

The first command returns the binary expansion of 654321. (Note that this is actually an integer whose decimal expansion has only 0's and 1's.; cf. Maple's help apge on "convert/binary".)
The second command gives the list of binary digits (bits) of the binary expansion of 654321 in reverse order.

Problem 4(b): A program which converts a given integer n > 0 into its binary form (list of bits).
Input: an integer n > 0. Output: the list of bits of n in reverse order (as for the convert(*, base, 2) command).

```
> binexp := proc(n) local ls, q, r;
    ls := [ ]; q := n;
    while(q ≠ 0) do;
      r := irem(q, 2); q := iquo(q, 2);
      ls := [op(ls), r]; od;
    return(ls); end;
```

```
binexp := proc(n)
    local ls, q, r;
    ls := [ ];
    q := n;
    while q <> 0 do r := irem(q, 2); q := iquo(q, 2); ls := [op(ls), r] end do;
    return ls
end proc
```

(3)

Testing this for n = 654321 yields:

```
> binexp(654321);
```

$$[1, 0, 0, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 1] \quad \textbf{(4)}$$

By inspection we see that this is the same answer as obtained by the command *convert*(654321, *base*, 2).
A better way to check this is by using MAPLE's evalb command:

```
> evalb(binexp(654321) = b);
```

$$true \quad \textbf{(5)}$$

```
>
```