

1(a)

Algorithm: Convert a decimal

Input: Given integer

Output: Result

Start with, quotient = given integer

DO WHILE quotient is not zero

Collect

residual = mod(quotient, 2)

IF residual is zero

replace quotient by half of
itself

ELSE

replace quotient by $\frac{\text{quotient}-1}{2}$

END IF

END DO WHILE

count how many iterations are in
above WHILE loop

Collect all residual and obtain
final result.

1(b)

result = ~~power~~
FUNCTION Convert_decimal (Input)

(this function is appended in solution
code amath3132hw1.m

1(c) do your self

1(d)

Base-10	Base-2	dec2bin
191	10111111	✓
396	110001100	✓
3196	110001111100	✓
9164	10001111001100	✓

2(a)

$$\ln(1+x) \approx x \quad \text{for } n=1$$

$$\ln(1+x) \approx x - \frac{x^2}{2} \quad \text{for } n=2$$

$$\ln(1+x) \approx x - \frac{x^2}{2} + \frac{x^3}{3} \quad \text{for } n=3$$

$$\ln(1+x) \approx x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} \quad \text{for } n=4$$

function Result = lon(x, n) is appended
in code amath3132hw2.m

2(b)

$$n=1, \text{ error} = 9.4 \times 10^{-2}$$

$$n=2, \text{ error} = 3.0 \times 10^{-2}$$

$$n=3, \text{ error} = 1.1 \times 10^{-2}$$

$$n=4, \text{ error} = 4.4 \times 10^{-3}$$

2(c)

$$n=1, \text{ relative error} = 2.3 \times 10^{-1}$$

$$n=2, \quad \quad \quad \quad \quad = 7.5 \times 10^{-2}$$

$$n=3, \quad \quad \quad \quad \quad = 2.7 \times 10^{-2}$$

$$n=4, \quad \quad \quad \quad \quad = 1.0 \times 10^{-2}$$

for $2 \leq n$ one significant digits.

2(d)

The plot is attached.

3(a)

function plot_xy(x, y, fig, opt)

function plot_surf(xbound, ybound)

are appended in amathhw1.m.

Plots are attached.