HW1

1. (a) $\dfrac{1-\sec x}{\tan^2 x} = -\dfrac{1}{\sec x + 1}$

```
res1 =

  列 1 至 6

  -0.498747913711435  -0.499987499790956  -0.499999875014289  -0.499999993627931  -0.500000041336852  -0.500044450290837

  列 7 至 12

  -0.510702591327569                   0                   0                   0                   0                   0

  列 13 至 14

                   0                   0

res2 =

  列 1 至 6

  -0.498747913711429  -0.499987499791664  -0.499999874999979  -0.499999998750000  -0.499999999987500  -0.499999999999875

  列 7 至 12

  -0.499999999999999  -0.500000000000000  -0.500000000000000  -0.500000000000000  -0.500000000000000  -0.500000000000000

  列 13 至 14

  -0.500000000000000  -0.500000000000000
```

(b) $\dfrac{1-(1-x)^3}{x} = x^2 - 3x + 3$

```
res3 =

  列 1 至 7

    2.709999999999999   2.970099999999998   2.997000999999999   2.999700010000161   2.999970000083785   2.999997000041610   2.999999698660716

  列 8 至 14

    2.999999981767587   2.999999915154206   3.000000248221113   3.000000248221113   2.999933634839635   3.000932835561798   2.997602166487923

res4 =

  列 1 至 7

    2.710000000000000   2.970100000000000   2.997001000000000   2.999700010000000   2.999970000100000   2.999997000001000   2.999999700000010

  列 8 至 14

    2.999999970000000   2.999999997000000   2.999999999700000   2.999999999970000   2.999999999997000   2.999999999999700   2.999999999999970

fx >>
```

2.

$$c - a = \frac{b^2}{\sqrt{a^2+b^2}+a}$$

$$= 2.233221447310594e-10$$

3.

牛顿迭代法: $g(x) = x - \frac{f(x)}{f'(x)}$

(a) $f(x) = x^5 + x - 1$

$$g(x) = x - \frac{x^5+x-1}{5x^4+1}$$

$$= \frac{4x^5+1}{5x^4+1}$$

(b) $f(x) = \sin x - 6x - 5$

$$g(x) = x - \frac{\sin x - 6x - 5}{\cos x - 6}$$

$$= \frac{x\cos x - \sin x + 5}{\cos x - 6}$$

(c) $f(x) = \ln x + x^2 - 3$

$$g(x) = x - \frac{\ln x + x^2 - 3}{\frac{1}{x} + 2x}$$

$$= \frac{-x^3 + 2x^2 + 4x - x\ln x}{2x + 1}$$

```
>> hw1_3

ka =

     5

   0.754877666246693

kb =

     3

  -0.970898923504256

kc =

    22

   1.592142938957742
```