1.

(a), $f(x) = x^2 - 4, f'(x) = 2x, x_0 = 1$

$$x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)}$$

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = x_0 - \frac{x_0^2 - 4}{2x_0} = 1 + \frac{3}{2} = \frac{5}{2}$$

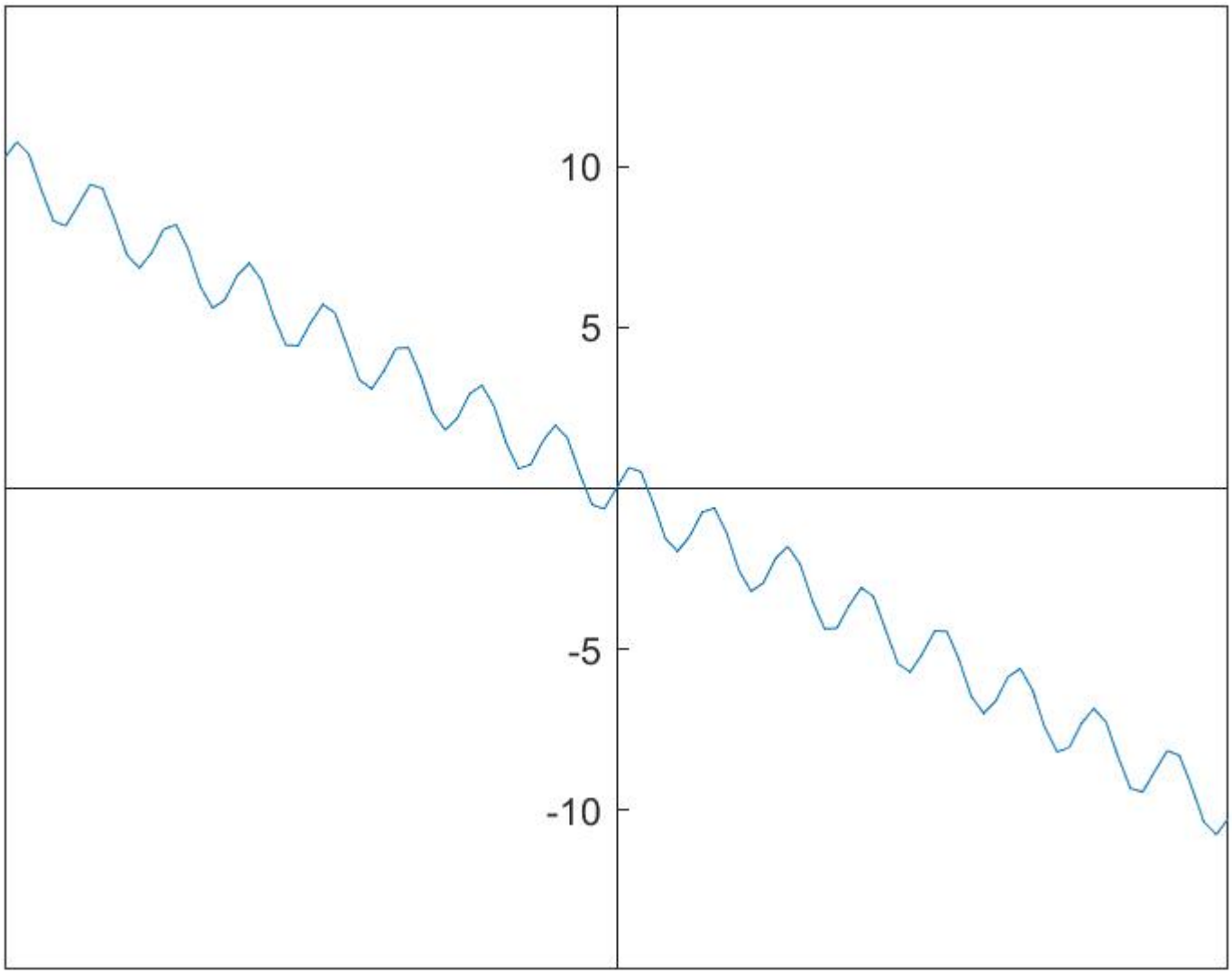
(b)$f(x) = x^2 - 4, x_0 = 1, x_1 = 3, f(x_0) = -3, f(x_1) = 5,$

$$x_{k+1} = x_k - f(x_k)\frac{x_k - x_{k-1}}{f(x_k) - f(x_{k-1})}$$

$$x_2 = x_1 - f(x_1)\frac{x_1 - x_0}{f(x_1) - f(x_0)} = 3 - 5\frac{3-1}{5+3} = 3 - \frac{5}{4} = 1.75$$

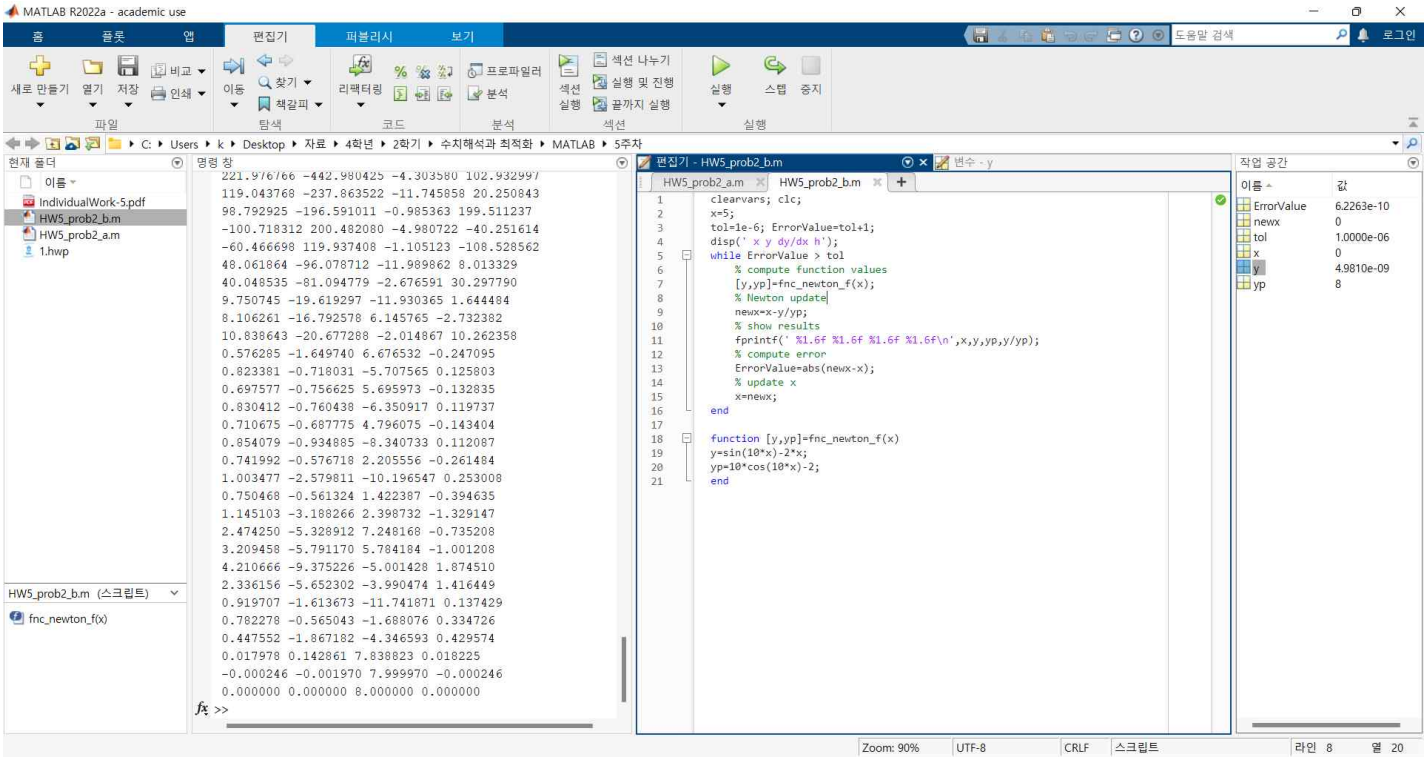
2.

(a) 3개의 근을 가진다

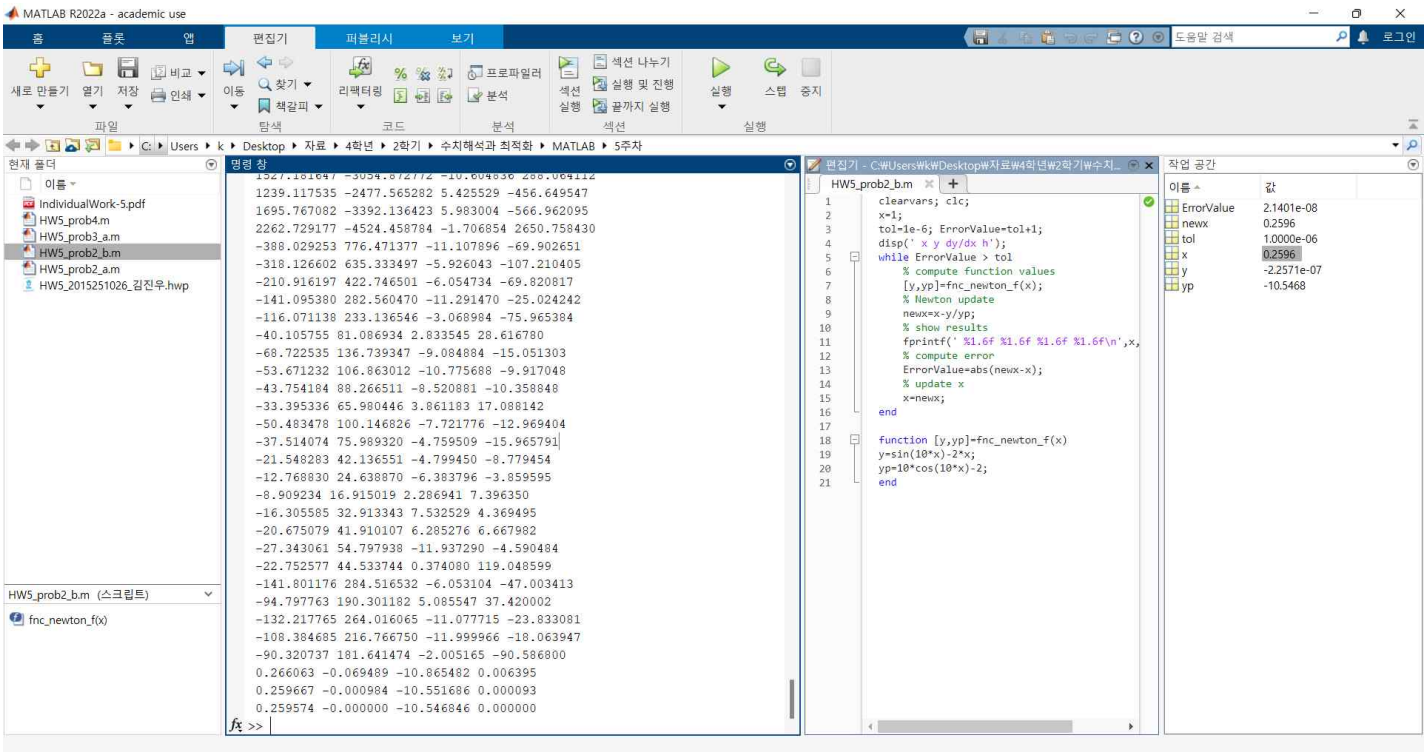


(b)

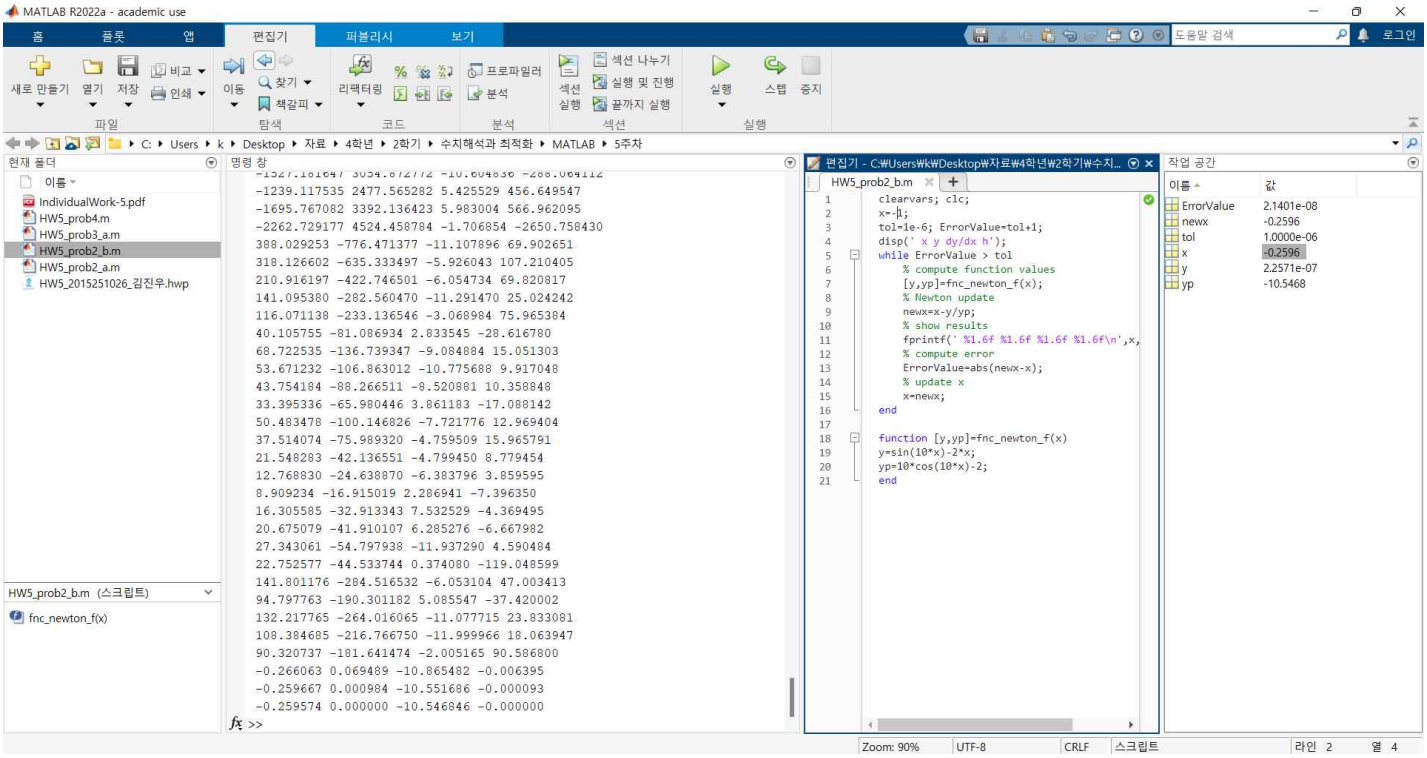
경우1. 0를 근으로 갖는다



경우2. 0.259574를 근으로 갖는다.

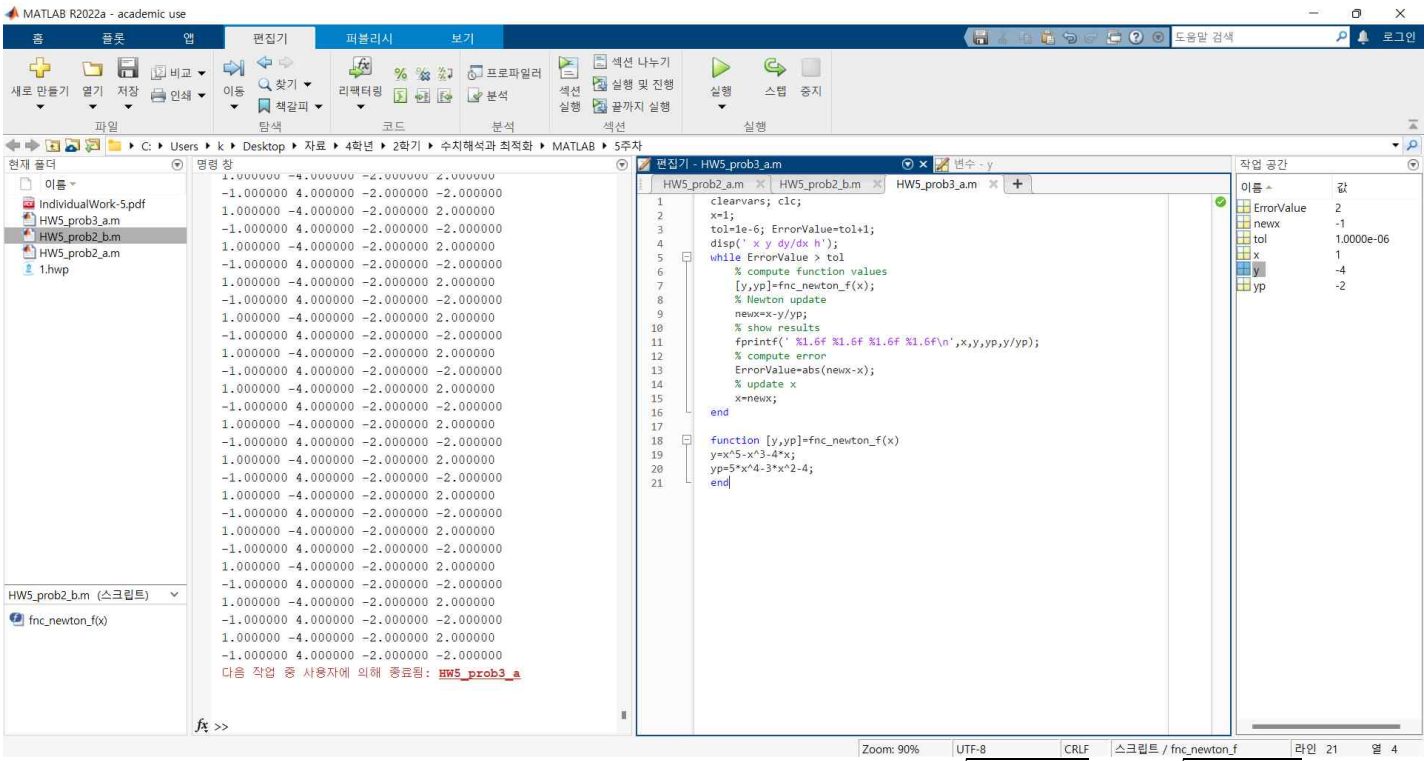


경우3. -0.259574를 근으로 갖는다.



3.

(a) 발산한다.



(b) $x^5 - x^3 - 4x = x(x^4 - x^2 - 4) = x(x^2 - \frac{1+\sqrt{17}}{2})(x^2 + \frac{\sqrt{17}-1}{2}) = x(x \pm \sqrt{\frac{1+\sqrt{17}}{2}})(x \pm \sqrt{\frac{\sqrt{17}-1}{2}}\, i) = 0$

$x = 0,\ \pm\sqrt{\frac{1 \pm \sqrt{17}}{2}}, \pm\sqrt{\frac{\sqrt{17}-1}{2}}\, i$

실재하지 않는 근 $\pm\sqrt{\frac{\sqrt{17}-1}{2}}\, i$은 수치적으로 찾기 어렵다.

4.

명령 창

```
sol =

    1.3065

fx >>
```

편집기 - C:₩Users₩k₩Desktop₩자료₩4학년₩2학기₩수치해석과 최적화₩MATLAB₩5주차₩HW...

untitled.m | untitled2.m | untitled3.m | untitled4.m | HW5_prob4.m

```
clearvars; clc;
x0=1;
x1=2;
tol=1e-6; ErrorValue=tol+1;
while ErrorValue > tol
% -- compute function values
y0=fnc_f(x0);
y1=fnc_f(x1);
% -- Secant update
x2=x1-y1*(x1-x0)/(y1-y0);
% -- compute error
ErrorValue=abs(x2-x1);
% -- update x
x0=x1;
x1=x2;
end
sol=x2

function yp=fnc_f(x)
yp= (x.^2-1)./(2*x)-cot(x);
end
```