

1. (a)

$\because x \in [0, 1]$
 $\therefore g(x) \in [3/4, 1]$
 $\therefore g(x) \in [0, 1]$
 $\because g'(x) = -x/2$
 $\therefore |g'(x)| \leq 1/2 < 1$
 \therefore unique fixed point

(b)

$\because x \in [0, 1]$
 $\therefore g(x) \in [1/2, 1]$
 $\therefore g(x) \in [0, 1]$
 $\because g'(x) = -2^{-x} \ln(2)$
 $\therefore |g'(x)| \leq \ln(2) < 1$
 \therefore unique fixed point

(c)

$\because x \in [0.5, 5.2]$
 $\therefore g(x) \in [5/26, 2]$
 $\therefore g(x) \notin [0.5, 5.2]$
 \therefore no fixed point

4. $\because x = g(x)$

$\therefore x = \pm 2$
 $\because g'(x) = 2x+1$
 $\therefore |g'(x)| > 1$ on $x \in [-3, -1]$
 \therefore not converge to $P = -2$
 $\because |g'(x)| > 1$ on $x \in [1, 3]$
 \therefore not converge to $P = 2$

5. $\because x = g(x)$

$\therefore x = 2k\pi \ (k \in \mathbb{Z})$
 $\because g'(x) = \cos(x) - x \sin(x)$
 $\therefore g'(2k\pi) = 1$
 \therefore 不存在 K 使 $|g'(x)| \leq K < 1$ on $x \in D(2k\pi \in D)$

4.

//f.m

```

function [y] = f(x)
    y = exp(x) - 2 - x;
end

//untitled.m
a = -2.4;
b = -1.6;
for i = 1:4
    c = b - f(b) * (b - a) / (f(b) - f(a))
    if (f(c) > 0 && f(a) < 0) || (f(c) < 0 && f(a) > 0)
        b = c;
    elseif (f(c) > 0 && f(b) < 0) || (f(c) < 0 && f(b) >
0)
        a = c;
    elseif (f(c) == 0)
        break;
    end
end
end

```

$\therefore -1.8301, -1.8409, -1.8414, -1.8414$

9. (a)
 $\therefore f(3) > 0, f(7) > 0$
 \therefore 无法开始
 (b)

```

//g.m
function [y] = g(x)
    y = 1 / (x - 2);
end

//untitled2.m
a = 1;
b = 7;
for i = 1:100
    c = (a + b) / 2
    if (g(c) > 0 && g(a) < 0) || (g(c) < 0 && g(a) > 0)
        b = c;
    elseif (g(c) > 0 && g(b) < 0) || (g(c) < 0 && g(b) >
0)
        a = c;
    elseif (g(c) == 0)
        break;
    else

```

```

        break;
    end
end

```

$\therefore f(1) < 0, f(7) > 0, f$ 不连续
 \therefore 最后a, b, c都是2
 \therefore 无法结束

11.

```

//untitled3.m
a = 2;
b = 7;
d = 5e-9;
N = ceil((log(b - a) - log(d)) / log(2))

```

$\therefore 30$

12. (a)

$\therefore f(x) = x^3 - 3x - 2$
 $\therefore f'(x) = 3x^2 - 3$
 $\therefore p(k) = p(k-1) - f(p(k-1)) / f'(p(k-1))$

(b)

```

//h.m
function [y] = h(x)
    y = x - (x ^ 3 - 3 * x - 2) / (3 * x ^ 2 - 3);
end

```

```

//untitled4.m
p = 2.1;
for i = 1:4
    p = h(p)
end

```

$\therefore p_1 = 2.0061, p_2 = 2.0000, p_3 = 2.0000, p_4 = 2$

(c)

$\therefore f(x) = x^3 - 3x - 2 = (x+1)(x^2 - x - 2) = (x+1)(x+1)(x-2)$
 $\therefore x = 2$ is a simple root
 \therefore quadratic

8.

```
//e.m
function [y] = e(x)
    y = x ^ 2 - 2 * x - 1;
end
```

```
//untitled5.m
p(1)=2.6;
p(2)=2.5;
for i = 3:10
    p(i)=p(i-1)-f(p(i-1))*(p(i-1)-p(i-2))/(f(p(i-1))-
f(p(i-2)));
end
```

```
2.600000000000000, 2.500000000000000, 1.84962687831745,
1.53443430167933, 1.28645194021969, 1.17916808556119,
1.14936343509181, 1.14626875095501, 1.14619339590106,
1.14619322063029
```

$\therefore 1.14619322063029$