

question 1

```
clear; clc;

f = @(x) x.^2 + 54./x;
x = 1.0;
delta = 0.5;
tol = 1e-4;

while delta >= tol
    f0 = f(x);

    if f(x + delta) < f0 && (x + delta) <= 5
        x = x + delta;
    elseif f(x - delta) < f0 && (x - delta) >= 1
        x = x - delta;
    else
        delta = delta / 2;
    end
end

fprintf('Minimum at x = %.4f, f(x) = %.4f\n', x, f(x));
```

Minimum at x = 3.0000, f(x) = 27.0000

question 2

```
clear; clc;

f = @(x) -3.*x.^3.*sin(2.*x) + 4.*x.*cos(3.*x) + 2.*x + 4;

x = 4.0;
delta = 0.5;
tol = 1e-5;
lowB = 3.5;
highB = 5.0;

while delta >= tol
    f0 = f(x);
    if (x + delta) <= highB && f(x + delta) < f0
        x = x + delta;
    elseif (x - delta) >= lowB && f(x - delta) < f0
        x = x - delta;
    else
        delta = delta / 2;
    end
end
```

```
fprintf('Minimum at x = %.6f, f(x) = %.6f\n', x, f(x));
```

Minimum at x = 4.078156, f(x) = -166.668538

question 3

```
clear; clc;

f = @(x) (x.^3)* cos(2.*x) + exp(x);

x      = 5.0;
delta  = 0.5;
tol     = 1e-5;
lowB    = 4.0;
highB   = 6.0;

while delta >= tol
    f0 = f(x);

    if (x + delta) <= highB && f(x + delta) < f0
        x = x + delta;
    elseif (x - delta) >= lowB && f(x - delta) < f0
        x = x - delta;
    else
        delta = delta / 2;
    end
end

fprintf('Approximate minimum at x = %.6f, f(x) = %.6f\n', x, f(x));
```

Approximate minimum at x = 4.614380, f(x) = 4.555065

question 4

```
clear; clc;

f = @(x) 2.*x.^2 + 16./x;

x      = 1.0;
delta  = 0.5;
tol     = 1e-6;
lowB    = 1.0;
highB   = 3.0;

while delta >= tol
```

```

f0 = f(x);
if (x + delta) <= highB && f(x + delta) < f0
    x = x + delta;
elseif (x - delta) >= lowB && f(x - delta) < f0
    x = x - delta;
else
    delta = delta / 2;
end
end
fprintf('Approximate minimum at x = %.6f, f(x) = %.6f\n', x, f(x));

```

Approximate minimum at x = 1.587400, f(x) = 15.119053

question 5

```

clear; clc;

f = @(x) x.^5 - 5.*x.^3 - 20.*x + 5;

x      = 2.0;
delta  = 0.5;
tol     = 1e-5;
lowB    = 1.0;
highB   = 4.0;

while delta >= tol
    f0 = f(x);

    if (x + delta) <= highB && f(x + delta) < f0
        x = x + delta;
    elseif (x - delta) >= lowB && f(x - delta) < f0
        x = x - delta;
    else
        delta = delta / 2;
    end
end

fprintf('Approximate minimum at x = %.6f, f(x) = %.6f\n', x, f(x));

```

Approximate minimum at x = 2.000000, f(x) = -43.000000

question 6

```

clear; clc;

```

```

f = @(x) -4.*x.^3 + 100 + exp(x);

x      = 6.0;
delta = 1.0;
tol    = 0.01;
lowB   = 5.0;
highB  = 7.0;

while delta >= tol
    f0 = f(x);

    if (x + delta) <= highB && f(x + delta) < f0
        x = x + delta;
    elseif (x - delta) >= lowB && f(x - delta) < f0
        x = x - delta;
    else
        delta = delta / 2;
    end
end

fprintf('Approximate minimum at x = %.2f, f(x) = %.2f\n', x, f(x));

```

Approximate minimum at x = 6.11, f(x) = -362.06

question 7

```

clear; clc;

f = @(x) exp(x) - 2.*x;

x      = 0.0;
delta = 0.6;
tol    = 1e-4;
lowB   = -1.0;
highB  = 1.0;

while delta >= tol
    f0 = f(x);

    if (x + delta) <= highB && f(x + delta) < f0
        x = x + delta;
    elseif (x - delta) >= lowB && f(x - delta) < f0
        x = x - delta;
    else
        delta = delta / 2;
    end
end

```

```
end
end

fprintf('Approximate minimum at x = %.4f, f(x) = %.4f\n', x, f(x));

Approximate minimum at x = 0.6932, f(x) = 0.6137
```

q8