

- Previous Lecture:
 - Max & Min
 - Branching
- Today's Lecture:
 - More branching—*nesting*
 - Logical operators and values
- Reading: "Chapter File" Sec 1.4

Write a program fragment to find the minimum value in

$$q(x) = x^2 + bx + c$$

on the interval $[L, R]$, given b, c, L, R .

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Algorithm

- If $x_c \in [L, R]$
 - Calculate $q(x_c) = -\frac{b^2}{4} + c$
- Otherwise
 - Min value is minimum between $q(L), q(R)$

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Algorithm

- If $x_c \in [L, R]$
 - Calculate $q(x_c) = -\frac{b^2}{4} + c$
 - Otherwise
 - Min value is minimum between $q(L), q(R)$
- Another if statement!

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Detailed Algorithm

Calculate x_c

if $L \leq x_c \leq R$ outer if statement

 calculate q_{Min}

Otherwise

 Calculate q_L, q_R

 if $q_L < q_R$ inner if statement

$q_{Min} = q_L$

 otherwise

$q_{Min} = q_R$

```
% find min of q(x)=x*x+bx+c
```

```
% given b,c,L,R
```

```
xc= -b/2; % critical value
```

```
if (L<=xc && xc<=R)
```

```
    % calculate q(xc)
```

```
else
```

```
    % calc q(L),q(R)
```

```
    % find min of q(L),q(R)
```

```
end
```

Logical operators

- `&&` logical and
- `||` logical or
- `~` logical not

Note: MATLAB evaluates `&&` before `||`

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"false" is 0, "true" is non-zero

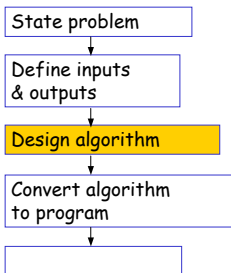
X	Y	X && Y "and"	X Y "or"	~X "not"
1	1			
1	0			
0	1			
0	0			

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Top-Down Design

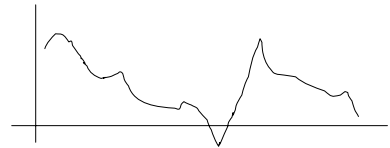


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How do we find the minimum value of a general function $f(x)$ within some specified domain?



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How do we find the minimum value of a general function $f(x)$ within some specified domain?

Within the domain, **repeatedly** choose x value and evaluate $f(x)$.

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