```
>> constants
>> grid_search
Not enough input arguments.

Error in constraints>@(wa,wb,L,F)1-wb/wb_min (line 5)
g1b = @(wa, wb, L, F) 1- wb/wb_min;

Error in grid_search (line 29)
                    g1b(x_k)

>> linearize(g1a, wa_k, wb_k, L_k, F_k)

ans =

  function_handle with value:

    @(wa,wb,L,F)subs(fun,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(wa-wa_k)*subs(diff(fun,wa),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(wb-wb_k)*subs(diff(fun,wb),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(L-L_k)*subs(diff(fun,L),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(F-F_k)*subs(diff(fun,F),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])

>> g1a_lin = linearize(g1a, wa_k, wb_k, L_k, F_k)

g1a_lin =

  function_handle with value:

    @(wa,wb,L,F)subs(fun,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(wa-wa_k)*subs(diff(fun,wa),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(wb-wb_k)*subs(diff(fun,wb),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(L-L_k)*subs(diff(fun,L),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(F-F_k)*subs(diff(fun,F),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])
```

```
>> subs(g1a_lin)
Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in
linearize>@(wa,wb,L,F)subs(fun,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+
(wa-wa_k)*subs(diff(fun,wa),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(wb-
wb_k)*subs(diff(fun,wb),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(L-L_k)
*subs(diff(fun,L),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(F-F_k)*subs(diff
(fun,F),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])
(line 2)
    fun_lin = @(wa, wb, L, F) subs(fun, [wa, wb, L, F], [wa_k, wb_k, L_k,
F_k]) + ...

Error in sym>funchandle2ref (line 1339)
    S = x(S{:});

Error in sym>tomupad (line 1252)
    x = funchandle2ref(x);

Error in sym (line 229)
            S.s = tomupad(x);

Error in subs (line 68)
    r_unique_name = subs(sym(f_unique_name),varargin{:});

>> grid_search
```

Error: File: grid_search.m Line: 39 Column: 17
Illegal use of reserved keyword "for".

>> grid_search
Error: File: grid_search.m Line: 39 Column: 17
Illegal use of reserved keyword "for".

>> grid_search
Error: File: grid_search.m Line: 39 Column: 17
Illegal use of reserved keyword "for".

>> grid_search
Error: File: grid_search.m Line: 51 Column: 81
Invalid expression. When calling a function or indexing a variable, use ↙
parentheses.
Otherwise, check for mismatched delimiters.

>> grid_search

constr_eval =

[]

Error using vertcat
Nonscalar arrays of function handles are not allowed; use cell arrays ↙
instead.

Error in grid_search (line 29)
[linearize(g1a, wa_k, wb_k, L_k, F_k)

>> grid_search

constr_eval =

```
     []

Error using vertcat
Nonscalar arrays of function handles are not allowed; use cell arrays↙
instead.

Error in grid_search (line 39)
                constraints = [

>> grid_search

constr_eval =

     []

Error using horzcat
Nonscalar arrays of function handles are not allowed; use cell arrays↙
instead.

Error in grid_search (line 40)
                    double(subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k,↙
F_k]))

>>  double(subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]))
Error using horzcat
Nonscalar arrays of function handles are not allowed; use cell arrays↙
instead.

>>  double(subs(g1a_lin, [wa wb L F], [wa_k wb_k L_k F_k]))
Error using horzcat
Nonscalar arrays of function handles are not allowed; use cell arrays↙
instead.

>> grid_search
```

```
constr_eval =

    []

Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 42)
                double(subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k,
F_k]))

>>  double(subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]))
Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

>>  double(subs(sym(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k])))
Error using sym (line 258)
Syntax with three arguments requires the second argument to be an
integer or a vector of
```

two integers specifying the dimensions.

```
>> grid_search

constr_eval =

    []

Unrecognized function or variable 'wa'.

Error in linearize (line 2)
   fun_lin = subs(fun, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]) + ...

Error in grid_search (line 31)
            g1a_lin =  linearize(g1a, wa_k, wb_k, L_k, F_k);

>> grid_search

constr_eval =

    []

Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 42)
                double(subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k,
```

```
F_k]))

>> double(g1a_lin(wa_k, wb_k, L_k, F_k))
Error using sym/subs>normalize (line 231)
Entries in second argument must be scalar.

Error in sym/subs>mupadsubs (line 157)
[X2,Y2,symX,symY] = normalize(X,Y); %#ok

Error in sym/subs (line 145)
    G = mupadsubs(F,X,Y);

Error in subs (line 68)
    r_unique_name = subs(sym(f_unique_name),varargin{:});

Error in
linearize>@(wa,wb,L,F)subs(fun,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+
(wa-wa_k)*subs(diff(fun,wa),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(wb-
wb_k)*subs(diff(fun,wb),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(L-L_k)
*subs(diff(fun,L),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])+(F-F_k)*subs(diff
(fun,F),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k])
(line 2)
    fun_lin = @(wa, wb, L, F) subs(fun, [wa, wb, L, F], [wa_k, wb_k, L_k,
F_k]) + ...

>> grid_search

constr_eval =

     []

Check for missing argument or incorrect argument data type in call to
function 'diff'.
```

```
Error in
linearize>@(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs
(diff(fun,wa),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs
(diff(fun,wb),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(diff
(fun,L),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(F-F_k)*eval(subs(diff(fun,
F),[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))
(line 3)
       (wa-wa_k) * eval(subs(diff(fun, wa), [wa, wb, L, F], [wa_k, wb_k,
L_k, F_k]) )+ ...

Error in grid_search (line 42)
                double(g1a_lin(wa_k, wb_k, L_k, F_k))

>> linearize
Not enough input arguments.

Error in linearize (line 2)
   d_wa = diff(fun, wa);

>> grid_search

constr_eval =

     []

Unrecognized function or variable 'wa'.

Error in linearize (line 2)
   d_wa = diff(fun, wa);

Error in grid_search (line 31)
            g1a_lin =  linearize(g1a, wa_k, wb_k, L_k, F_k);

>> grid_search
```

```
constr_eval =

     []

Error using sym/subs>normalize (line 231)
Entries in second argument must be scalar.

Error in sym/subs>mupadsubs (line 157)
[X2,Y2,symX,symY] = normalize(X,Y); %#ok

Error in sym/subs (line 145)
    G = mupadsubs(F,X,Y);

Error in
linearize>@(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs↙
(d_wa,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,↙
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],↙
[wa_k,wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,↙
L_k,F_k]))
(line 11)
        (wa-wa_k) * eval(subs(d_wa, [wa, wb, L, F], [wa_k, wb_k, L_k,↙
F_k]) )+ ...

Error in grid_search (line 42)
                double(g1a_lin(wa_k, wb_k, L_k, F_k))

>> grid_search

constr_eval =

     []

Error using subs
```

```
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 43)
                double(subs(g1b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k,↙
F_k]))

>> grid_search

constr_eval =

    []

Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 43)
                double(subs(g1b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k,↙
F_k]))

>> grid_search
```

```
constr_eval =

    []

Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 43)
                double(eval(subs(g1b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k,↙
F_k])))

>> grid_search

constr_eval =

    []

Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);
```

Error in grid_search (line 43)
eval(subs(g1b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]))

>> eval(g1a_lin)
Error using eval
Must be a string scalar or character vector.

>> g1a_lin

g1a_lin =

function_handle with value:

@(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))

>> grid_search

constr_eval =

[]

d_wa =

-10/3

d_wa =

0

d_wa =

5/18

d_wa =

0

d_wa =

0

d_wa =

(3^(1/2)*F)/(11*L*wa^2) - (2*3^(1/2)*F*(wa + wb))/(11*L*wa^3)

d_wa =

(15*3^(1/2)*F)/(53*L*wb^2)

d_wa =

-((F/(wa + 1/2) + (3*F*(4*L^2 + (wa + wb)^2)*(wa + wb))/(4*L^2*wa^2))*↙
(F/(wa + 1/2)^2 - (3*F*(4*L^2 + (wa + wb)^2))/(4*L^2*wa^2) - (3*F*(2*wa↙
+ 2*wb)*(wa + wb))/(4*L^2*wa^2) + (3*F*(4*L^2 + (wa + wb)^2)*(wa +↙
wb))/(2*L^2*wa^3)) + (27*F^2*(wa + wb)^2)/(2*L^2*wa^3) - (27*F^2*↙

```
(2*wa + 2*wb))/(4*L^2*wa^2))/(94*((F/(wa + 1/2) + (3*F*(4*L^2 + (wa + wb)^2)*(wa + wb))/(4*L^2*wa^2))^2/2 + (27*F^2*(wa + wb)^2)/(4*L^2*wa^2))^(1/2))


d_wa =

(((3*F*(4*L^2 + (wa + wb)^2))/(4*L^2*wb^2) + (3*F*(2*wa + 2*wb)*(wa + wb))/(4*L^2*wb^2))*(F/(wb + 1/2) + (3*F*(4*L^2 + (wa + wb)^2)*(wa + wb))/(4*L^2*wb^2)) + (27*F^2*(2*wa + 2*wb))/(4*L^2*wb^2))/(21*((F/(wb + 1/2) + (3*F*(4*L^2 + (wa + wb)^2)*(wa + wb))/(4*L^2*wb^2))^2/2 + (27*F^2*(wa + wb)^2)/(4*L^2*wb^2))^(1/2))

Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 43)
                eval(subs(g1b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]))

>> grid_search

constr_eval =

     []


fun_lin =
```

```
  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,↙
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,↙
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,↙
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,↙
F_k]))


fun_lin =

  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,↙
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,↙
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,↙
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,↙
F_k]))


fun_lin =

  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,↙
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,↙
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,↙
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,↙
F_k]))


fun_lin =
```

```
  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,
F_k]))


fun_lin =

  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,
F_k]))


fun_lin =

  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,
F_k]))


fun_lin =

  function_handle with value:
```

```
    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,↙
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,↙
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,↙
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,↙
F_k]))


fun_lin =

  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,↙
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,↙
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,↙
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,↙
F_k]))


fun_lin =

  function_handle with value:

    @(wa,wb,L,F)fun(wa_k,wb_k,L_k,F_k)+(wa-wa_k)*eval(subs(d_wa,↙
[wa,wb,L,F],[wa_k,wb_k,L_k,F_k]))+(wb-wb_k)*eval(subs(d_wb,[wa,wb,↙
L,F],[wa_k,wb_k,L_k,F_k]))+(L-L_k)*eval(subs(d_L,[wa,wb,L,F],[wa_k,↙
wb_k,L_k,F_k]))+(F-F_k)*eval(subs(d_F,[wa,wb,L,F],[wa_k,wb_k,L_k,↙
F_k]))

Error using subs
Expected input number 1, S, to be one of these types:

sym
```

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 43)
eval(subs(g1b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]))

```
>> grid_search

constr_eval =

     []


fun_lin =

1 - (10*wa)/3


fun_lin =

1 - (10*wb)/3


fun_lin =

(5*wa)/18 + (5*wb)/18 - 1


fun_lin =

1 - (5*L)/9
```

fun_lin =

(5*L)/18 - 1

fun_lin =

(4377364406034771*wb)/180143985094819840 - (1459121468678257*L)/9007199254740992 + (50*3^(1/2)*(F - 1))/297 - (125*3^(1/2)*(wa - 3/5))/297 - 5067571289309697/900719925474099200

fun_lin =

(3406910976394987*wa)/4503599627370496 - (4542547968526649*L)/9007199254740992 - (5110366464592481*wb)/2251799813685248 + (250*3^(1/2)*(F - 1))/477 + 4850799929782161/2814749767106560

fun_lin =

(6881049028052111*F)/360287970189639680 - (2572518206299270*L)/9007199254740992 - (7161880454902565*wa)/1801439850948198400 + (1967452273074450*wb)/11258999068426240 - 14679917864424179/1801439850948198400

fun_lin =

(2406319228559890*F)/2814749767106560 - (2878770373715850*L)/2251799813685248 + (7045352901676125*wa)/9007199254740992 -

(40072426354811197*wb)/2251799813685248 -
7721570007581911/45035996273704960

fun_lin =

wa - (6*F)/5 + wb + 6/5

Conversion to logical from sym is not possible.

Error in grid_search (line 65)
if obj < obj_min

>> grid_search

constr_eval =

[]

Conversion to logical from sym is not possible.

Error in grid_search (line 65)
if obj < obj_min

>> double(eval(subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k])))

ans =

-1

>> double(eval(subs(g1b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k])))

ans =

```
    -1

>>  double(eval(subs(g4b_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k])))

ans =

  -0.092216557877947

>> double(eval(subs(g3_2_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k])))

ans =

  -0.500000000000000

>> grid_search

constr_eval =

     []

Conversion to logical from sym is not possible.

Error in grid_search (line 65)
                if obj < obj_min

>> grid_search

constr_eval =

     []

Conversion to logical from sym is not possible.

Error in grid_search (line 62)
```

```
                if obj < obj_min

>> grid_search

constr_eval =

    []


constraints =

  Columns 1 through 4

  -1.000000000000000  -1.000000000000000  -0.666666666666667↙
0

  Columns 5 through 8

  -0.500000000000000  -0.708408954954734  -0.092216557877947↙
-0.809012523387050

  Column 9

  -0.145103676113461

Conversion to logical from sym is not possible.

Error in grid_search (line 62)
                if obj < obj_min

>> grid_search

constr_eval =
```

```
     []


constraints =

  Columns 1 through 4

  -1.000000000000000  -1.000000000000000  -0.666666666666667↙
0

  Columns 5 through 8

  -0.500000000000000  -0.708408954954734  -0.092216557877947↙
-0.809012523387050

  Column 9

  -0.145103676113461

Conversion to logical from sym is not possible.

Error in grid_search (line 62)
                if obj < obj_min

>> grid_search

constraints =

  Columns 1 through 4

  -1.000000000000000  -1.000000000000000  -0.666666666666667↙
0

  Columns 5 through 8
```

-0.500000000000000 -0.708408954954734 -0.092216557877947↙
-0.809012523387050

Column 9

-0.145103676113461

Conversion to logical from sym is not possible.

Error in grid_search (line 61)
if obj < obj_min

>> grid_search

constraints =

Columns 1 through 4

-1.000000000000000 -1.000000000000000 -0.666666666666667↙
0

Columns 5 through 8

-0.500000000000000 -0.708408954954734 -0.092216557877947↙
-0.809012523387050

Column 9

-0.145103676113461

obj =

```
wa - (6*F)/5 + wb + 6/5

Conversion to logical from sym is not possible.

Error in grid_search (line 61)
                if obj < obj_min

>> grid_search

constraints =

  Columns 1 through 4

  -1.000000000000000  -1.000000000000000  -0.666666666666667↙
0

  Columns 5 through 8

  -0.500000000000000  -0.708408954954734  -0.092216557877947↙
-0.809012523387050

  Column 9

  -0.145103676113461


obj =

wa - (6*F)/5 + wb + 6/5


constraints =

  Columns 1 through 4
```

-1.000000000000000 -1.000000000000000 -0.666666666666667↙
0

Columns 5 through 8

-0.500000000000000 -0.416817909909469 0.815566884244106↙
-0.618025046774100

Column 9

0.709792647773078

constraints =

Columns 1 through 4

-1.000000000000000 -1.000000000000000 -0.666666666666667↙
0

Columns 5 through 8

-0.500000000000000 -0.125226864864203 1.723350326366159↙
-0.427037570161149

Column 9

1.564688971659617

constraints =

Columns 1 through 4

```
  -1.000000000000000  -1.000000000000000  -0.666666666666667↙
0

  Columns 5 through 8

  -0.500000000000000   0.166364180181062   2.631133768488212↙
-0.236050093548199

  Column 9

   2.419585295546156

>> grid_search
>> grid_search
Error using checkArgsForHandleToPrint
MATLAB Graphics handle must be a figure.

Error in checkArgsForHandleToPrint

Error in print>LocalCreatePrintJob (line 101)
handles = checkArgsForHandleToPrint(0, varargin{:});

Error in print (line 38)
[pj, inputargs] = LocalCreatePrintJob(varargin{:});

Error in grid_search (line 27)
        print(i, '%')

>> grid_search
Error using disp
Too many input arguments.

Error in grid_search (line 27)
```

```
        disp(i, '%')

>> grid_search
Error using checkArgsForHandleToPrint
MATLAB Graphics handle must be a figure.

Error in checkArgsForHandleToPrint

Error in print>LocalCreatePrintJob (line 101)
handles = checkArgsForHandleToPrint(0, varargin{:});

Error in print (line 38)
[pj, inputargs] = LocalCreatePrintJob(varargin{:});

Error in grid_search (line 27)
        print(i)

>> grid_search

i =

     1


i =

     2

>> grid_search

i =

     1
```

```
i =

     2

i =

     3

i =

     4

i =

     5

i =

     6

i =

     7

i =

     8
```

```
i =

     9


i =

    10

>> grid_search
i =

     1


i =

     2


i =

     3


i =

     4


i =
```

```
     5

>> grid_search

f_k =

34/105


i =

     1


i =

     2


i =

     3


i =

     4


i =

     5
```

```
i =

     6

i =

     7

i =

     8

i =

     9

i =

    10

i =

    11

i =

    12
```

```
i =

    13

i =

    14

i =

    15

i =

    16

i =

    17

i =

    18

i =
```

```
    19

i =

    20

i =

    21

i =

    22

i =

    23

i =

    24

i =

    25

i =
```

```
    26

i =

    27

i =

    28

i =

    29

i =

    30

i =

    31

i =

    32
```

```
i =

    33

i =

    34

i =

    35

i =

    36

i =

    37

i =

    38

i =

    39
```

```
i =

    40

i =

    41

i =

    42

i =

    43

i =

    44

i =

    45

i =

    46
```

```
i =

    47

i =

    48

i =

    49

i =

    50

i =

    51

i =

    52

i =
```

53

i =

54

i =

55

i =

56

i =

57

i =

58

i =

59

i =

60

i =

61

i =

62

i =

63

i =

64

i =

65

i =

66

```
i =

    67

i =

    68

i =

    69

i =

    70

i =

    71

i =

    72

i =

    73
```

```
i =

    74

i =

    75

i =

    76

i =

    77

i =

    78

i =

    79

i =

    80
```

```
i =

    81

i =

    82

i =

    83

i =

    84

i =

    85

i =

    86

i =
```

```
    87

i =

    88

i =

    89

i =

    90

i =

    91

i =

    92

i =

    93

i =
```

94

i =

95

i =

96

i =

97

i =

98

i =

99

i =

100

The minimum objective of 0.323810 with a max nominal stress of

3.088235 is reached for:
Index exceeds the number of array elements (1).

Error in sym/subsref (line 907)
R_tilde = builtin('subsref',L_tilde,Idx);

Error in grid_search (line 96)
fprintf('w_a* = %f \n', wa(x_k));

>> grid_search
Error: File: grid_search.m Line: 106 Column: 61
Invalid expression. When calling a function or indexing a variable, use parentheses.
Otherwise, check for mismatched delimiters.

>> grid_search

f_k =

3/5

The minimum objective of 0.600000 with a max nominal stress of 1.666667 is reached for:
w_a* = 0.600000
w_b* = 0.600000
L* = 1.800000
F* = 1.000000
And occurs for the following constraint values:
g1a = -1.000000
g1b = -1.000000
g2 = -0.666667
g3_1 = 0.000000
g3_2 = -0.500000
g4a = -0.708409

```
g4b = -0.092217
g5a = -0.809013
g5b = -0.145104
>> grid_search

f_k =

3/5

The minimum objective of 0.600000 with a max nominal stress of↙
1.666667 is reached for:
w_a* = 0.600000
w_b* = 0.600000
L* = 1.800000
F* = 1.000000
And occurs for the following constraint values:
g1a = -1.000000
g1b = -1.000000
g2 = -0.666667
g3_1 = 0.000000
g3_2 = -0.500000
g4a = -0.708409
g4b = -0.092217
g5a = -0.809013
g5b = -0.145104
>> grid_search
>> grid_search

ans =

     1

>> grid_search
     1
```

```
     1

     1

>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10

    11

    12

    13

    14
```

15

16

17

18

19

20

The minimum objective of 1.025455 with a max nominal stress of 0.975177 is reached for:
w_a* = 0.600000
w_b* = 0.600000
L* = 1.800000
F* = 1.000000
And occurs for the following constraint values:
g1a = -1.000000
g1b = -1.000000
g2 = -0.666667
g3_1 = 0.000000
g3_2 = -0.500000
g4a = -0.708409
g4b = -0.092217
g5a = -0.809013
g5b = -0.145104
>> grid_search
Unrecognized function or variable 'iter'.

Error in grid_search (line 16)
if iter == 0

```
>> grid_search
Unrecognized function or variable 'wa_best'.

Error in grid_search (line 23)
    was = linspace(wa_best - 0.3/iter, wa_best + 0.3/iter, Niter);

>> grid_search
Unrecognized function or variable 'wa_best'.

Error in grid_search (line 23)
    was = linspace(wa_best - 0.3/iter, wa_best + 0.3/iter, Niter);

>> grid_search
Unrecognized function or variable 'wa_k'.

Error in grid_search (line 36)
g1a_lin =  linearize(g1a, wa_k, wb_k, L_k, F_k);

>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8
```

```
     9

    10


iter =

     1

The minimum objective of 0.240000 with a max nominal stress of↙
4.166667 is reached for:
w_a* = 0.600000
w_b* = 0.600000
L* = 1.800000
F* = 5.000000
And occurs for the following constraint values:
g1a = -1.000000
g1b = -1.000000
g2 = -0.666667
g3_1 = 0.000000
g3_2 = -0.500000
g4a = 0.457955
g4b = 3.538917
g5a = -0.045063
g5b = 3.274482
>> grid_search
     1

     2

     3

     4
```

5

6

7

8

9

10

iter =

2

The minimum objective of 0.109091 with a max nominal stress of 9.166667 is reached for:
w_a* = 0.300000
w_b* = 0.300000
L* = 1.300000
F* = 5.500000
And occurs for the following constraint values:
g1a = 0.000000
g1b = 0.000000
g2 = -0.833333
g3_1 = 0.277778
g3_2 = -0.638889
g4a = 3.441156
g4b = 12.826240
g5a = 0.904817
g5b = 7.526324

```
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

     1

The minimum objective of 0.240000 with a max nominal stress of
4.166667 is reached for:
w_a* = 0.600000
w_b* = 0.600000
L* = 1.800000
F* = 5.000000
And occurs for the following constraint values:
g1a = -1.000000
```

```
g1b = -1.000000
g2 = -0.666667
g3_1 = 0.000000
g3_2 = -0.500000
g4a = 0.457955
g4b = 3.538917
g5a = -0.045063
g5b = 3.274482
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

     2
```

The minimum objective of 0.109091 with a max nominal stress of 9.166667 is reached for:
w_a* = 0.300000
w_b* = 0.300000
L* = 1.300000
F* = 5.500000
And occurs for the following constraint values:
Index in position 1 is invalid. Array indices must be positive integers or logical values.

Error in sym/subsref (line 907)
R_tilde = builtin('subsref',L_tilde,Idx);

Error in grid_search (line 127)
fprintf('g1a = %f \n', g1a_lin(wa_best, wb_best, L_best, F_best));

>> grid_search
1

2

3

4

5

6

7

8

9

```
    10


iter =

     1

The minimum objective of 0.240000 with a max nominal stress of
4.166667 is reached for:
w_a* = 0.600000
w_b* = 0.600000
L* = 1.800000
F* = 5.000000
And occurs for the following constraint values:
Index in position 2 is invalid. Array indices must be positive integers or
logical values.

Error in sym/subsref (line 907)
            R_tilde = builtin('subsref',L_tilde,Idx);

Error in grid_search (line 127)
fprintf('g1a = %f \n', g1a_lin(wa_best, wb_best, L_best, F_best));

>> grid_search
Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);
```

Error in grid_search (line 48)
g1a_k = subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]);

```
>> grid_search

fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin


fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin


fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin


fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin
```

```
fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin


fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin


fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin


fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin


fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin
```

```
fun_lin =

  function_handle with value:

    @(w_a,w_b,L,F)fun_lin

Error using subs
Expected input number 1, S, to be one of these types:

sym

Instead its type was function_handle.

Error in sym/subs (line 60)
validateattributes(F, {'sym'}, {}, 'subs', 'S', 1);

Error in grid_search (line 48)
g1a_k = subs(g1a_lin, [wa, wb, L, F], [wa_k, wb_k, L_k, F_k]);

>> linearize
Not enough input arguments.

Error in linearize (line 5)
    d_wa = diff(fun, wa);

>> grid_search
     1

     2

     3

     4
```

```
     5

     6

     7

     8

     9

    10


iter =

     2

The minimum objective of 0.109091 with a max nominal stress of↙
9.166667 is reached for:
w_a* = 0.300000
w_b* = 0.300000
L* = 1.300000
F* = 5.500000
And occurs for the following constraint values:
Index in position 1 is invalid. Array indices must be positive integers or↙
logical values.

Error in sym/subsref (line 907)
        R_tilde = builtin('subsref',L_tilde,Idx);

Error in grid_search (line 127)
fprintf('g1a = %f \n', g1a_lin(wa_best, wb_best, L_best, F_best));
```

```
>> grid_search
Error: File: grid_search.m Line: 127 Column: 95
Invalid expression. When calling a function or indexing a variable, use parentheses.
Otherwise, check for mismatched delimiters.

>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

     3

The minimum objective of 0.081159 with a max nominal stress of 12.321429 is reached for:
```

w_a* = 0.316667
w_b* = 0.150000
L* = 1.050000
F* = 5.750000
And occurs for the following constraint values:
g1a = -0.055556
g1b = 0.500000
g2 = -0.870370
g3_1 = 0.416667
g3_2 = -0.708333
g4a = 2.722008
g4b = 16.574200
g5a = 0.535040
g5b = 10.103942
>> grid_search
1

2

3

4

5

6

7

8

9

10

```
iter =

     4

The minimum objective of 9999999.000000 with a max nominal stress↙
of 0.000000 is reached for:
w_a* = 0.316667
w_b* = 0.150000
L* = 1.050000
F* = 5.750000
And occurs for the following constraint values:
g1a = -0.055556
g1b = 0.500000
g2 = -0.870370
g3_1 = 0.416667
g3_2 = -0.708333
g4a = 2.789623
g4b = 39.908820
g5a = 0.422736
g5b = 19.802544
>> grid_search
     1

     2

     3

     4

     5

     6
```

```
     7

     8

     9

    10


iter =

     1

The minimum objective of 0.620690 with a max nominal stress of↙
1.611111 is reached for:
w_a* = 0.600000
w_b* = 1.400000
L* = 3.000000
F* = 3.222222
And occurs for the following constraint values:
g1a = -1.000000
g1b = -3.666667
g2 = -0.444444
g3_1 = -0.666667
g3_2 = -0.166667
g4a = -0.745668
g4b = -0.450287
g5a = -0.644309
g5b = -0.048100
>> grid_search
     1

     2
```

3

4

5

6

7

8

9

10

iter =

2

The minimum objective of 0.543396 with a max nominal stress of 1.840278 is reached for:
w_a* = 0.500000
w_b* = 1.100000
L* = 3.500000
F* = 2.944444
And occurs for the following constraint values:
g1a = -0.666667
g1b = -2.666667
g2 = -0.555556
g3_1 = -0.944444
g3_2 = -0.027778

```
g4a = -0.303747
g4b = -0.478310
g5a = -0.208026
g5b = -0.049034
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

     3

The minimum objective of 0.531959 with a max nominal stress of
1.879845 is reached for:
w_a* = 0.450000
w_b* = 0.983333
```

```
L* = 3.583333
F* = 2.694444
And occurs for the following constraint values:
g1a = -0.500000
g1b = -2.277778
g2 = -0.601852
g3_1 = -0.990741
g3_2 = -0.004630
g4a = -0.241364
g4b = -0.457198
g5a = -0.127790
g5b = -0.004719
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10
```

```
iter =

     4

The minimum objective of 0.524188 with a max nominal stress of↙
1.907713 is reached for:
w_a* = 0.416667
w_b* = 0.927778
L* = 3.416667
F* = 2.564815
And occurs for the following constraint values:
g1a = -0.388889
g1b = -2.092593
g2 = -0.626543
g3_1 = -0.898148
g3_2 = -0.050926
g4a = -0.161076
g4b = -0.429708
g5a = -0.074990
g5b = -0.000040
>> grid_search
     1

     2

     3

     4

     5

     6

     7
```

8

9

10

iter =

5

The minimum objective of 0.518207 with a max nominal stress of 1.929732 is reached for:
w_a* = 0.404167
w_b* = 0.906944
L* = 3.479167
F* = 2.530093
And occurs for the following constraint values:
g1a = -0.347222
g1b = -2.023148
g2 = -0.635802
g3_1 = -0.932870
g3_2 = -0.033565
g4a = -0.094299
g4b = -0.431817
g5a = -0.013773
g5b = -0.001048
>> grid_search

1

2

3

4

5

6

7

8

9

10

iter =

6

The minimum objective of 0.518631 with a max nominal stress of 1.928154 is reached for:
w_a* = 0.400833
w_b* = 0.896944
L* = 3.440278
F* = 2.502315
And occurs for the following constraint values:
g1a = -0.336111
g1b = -1.989815
g2 = -0.639506
g3_1 = -0.911265
g3_2 = -0.044367
g4a = -0.083046
g4b = -0.425183

```
g5a = -0.011005
g5b = -0.000221
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

     7

The minimum objective of 0.518277 with a max nominal stress of↙
1.929471 is reached for:
w_a* = 0.403611
w_b* = 0.905278
L* = 3.454167
F* = 2.525463
```

And occurs for the following constraint values:
g1a = -0.345370
g1b = -2.017593
g2 = -0.636420
g3_1 = -0.918981
g3_2 = -0.040509
g4a = -0.079767
g4b = -0.427550
g5a = -0.004871
g5b = 0.000078
>> grid_search
1

2

3

4

5

6

7

8

9

10

iter =

8

The minimum objective of 0.518580 with a max nominal stress of 1.928343 is reached for:
w_a* = 0.401230
w_b* = 0.898135
L* = 3.434325
F* = 2.505622
And occurs for the following constraint values:
g1a = -0.337434
g1b = -1.993783
g2 = -0.639065
g3_1 = -0.907959
g3_2 = -0.046021
g4a = -0.076992
g4b = -0.424035
g5a = -0.007378
g5b = 0.000052
>> grid_search
1

2

3

4

5

6

7

8

```
     9

    10


iter =

     9

The minimum objective of 0.518314 with a max nominal stress of↙
1.929331 is reached for:
w_a* = 0.403313
w_b* = 0.904385
L* = 3.451687
F* = 2.522983
And occurs for the following constraint values:
g1a = -0.344378
g1b = -2.014616
g2 = -0.636750
g3_1 = -0.917604
g3_2 = -0.041198
g4a = -0.077387
g4b = -0.427095
g5a = -0.003515
g5b = 0.000033
>> grid_search
     1

     2

     3

     4
```

5

6

7

8

9

10

iter =

10

The minimum objective of 0.518550 with a max nominal stress of 1.928453 is reached for:
w_a* = 0.401462
w_b* = 0.898829
L* = 3.436254
F* = 2.507551
And occurs for the following constraint values:
g1a = -0.338205
g1b = -1.996098
g2 = -0.638808
g3_1 = -0.909030
g3_2 = -0.045485
g4a = -0.075615
g4b = -0.424341
g5a = -0.005804
g5b = 0.000029

```
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

    11

The minimum objective of 0.517795 with a max nominal stress of
1.931268 is reached for:
w_a* = 0.399795
w_b* = 0.897163
L* = 3.461254
F* = 2.504773
And occurs for the following constraint values:
g1a = -0.332650
```

```
g1b = -1.990542
g2 = -0.639734
g3_1 = -0.922919
g3_2 = -0.038540
g4a = -0.077438
g4b = -0.428373
g5a = -0.002178
g5b = -0.001118
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

    12
```

The minimum objective of 0.516938 with a max nominal stress of
1.934467 is reached for:
w_a* = 0.398280
w_b* = 0.892617
L* = 3.478931
F* = 2.497197
And occurs for the following constraint values:
g1a = -0.327599
g1b = -1.975391
g2 = -0.641417
g3_1 = -0.932740
g3_2 = -0.033630
g4a = -0.081744
g4b = -0.429920
g5a = -0.002566
g5b = -0.000183
>> grid_search
1

2

3

4

5

6

7

8

9

10

iter =

13

The minimum objective of 0.516596 with a max nominal stress of↙
1.935749 is reached for:
w_a* = 0.397585
w_b* = 0.891460
L* = 3.481632
F* = 2.495268
And occurs for the following constraint values:
g1a = -0.325285
g1b = -1.971533
g2 = -0.641932
g3_1 = -0.934240
g3_2 = -0.032880
g4a = -0.079799
g4b = -0.430131
g5a = -0.000072
g5b = -0.000065
>> grid_search
1

2

3

4

5

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7

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11

12

13

14

15

16

17

18

19

20

iter =

1

The minimum objective of 0.589831 with a max nominal stress of 1.695402 is reached for:
w_a* = 0.600000
w_b* = 1.231579
L* = 3.300000
F* = 3.105263
And occurs for the following constraint values:
g1a = -1.000000
g1b = -3.105263
g2 = -0.491228
g3_1 = -0.833333
g3_2 = -0.083333
g4a = -0.765320
g4b = -0.460506
g5a = -0.686617
g5b = -0.102693
>> grid_search
1

2

3

4

5

6

7

8

9

10

iter =

2

The minimum objective of 0.549495 with a max nominal stress of 1.819853 is reached for:
w_a* = 0.433333
w_b* = 0.998246
L* = 3.133333
F* = 2.605263
And occurs for the following constraint values:
g1a = -0.444444
g1b = -2.327485
g2 = -0.602339
g3_1 = -0.740741
g3_2 = -0.129630
g4a = -0.316614
g4b = -0.429548
g5a = -0.244048
g5b = -0.029757
>> grid_search
1

2

3

4

5

6

7

8

9

10

iter =

3

The minimum objective of 0.527491 with a max nominal stress of 1.895767 is reached for:
w_a* = 0.425000
w_b* = 0.956579
L* = 3.230556
F* = 2.619152
And occurs for the following constraint values:
g1a = -0.416667
g1b = -2.188596
g2 = -0.616228
g3_1 = -0.794753
g3_2 = -0.102623
g4a = -0.055776
g4b = -0.402849
g5a = -0.030327
g5b = -0.004511

```
>> grid_search
     1

     2

     3

     4

     5

     6

     7

     8

     9

    10


iter =

     4

The minimum objective of 0.524475 with a max nominal stress of
1.906669 is reached for:
w_a* = 0.413889
w_b* = 0.930653
L* = 3.249074
F* = 2.563596
And occurs for the following constraint values:
g1a = -0.379630
```

g1b = -2.102177
g2 = -0.626516
g3_1 = -0.805041
g3_2 = -0.097479
g4a = -0.035086
g4b = -0.399791
g5a = -0.009401
g5b = -0.000476
>>