p2: (x!=y? true); (x>y? true) ; x=x-y ;

(x !=y ? true) ; (x>y ? false) ; y=y-x ;

(x !=y ? false)

[p2] = {(s,s’)| x>y & x’=x-y & y’=y} \* {(s,s’)| x<y & x’=x & y’=y-x} \* {(s,s’)| x’=x & y’=y & x=y}

= {(s,s’)| x>y & x-y<y & x’=x-y & y’=y-(x-y)} \* {(s,s’)| x’=x & y’=y & x=y}

= {(s,s’)| x>y & x-y<y & x’=x-y & y’=y-(x-y) & x’=y’}

= {(s,s’)| x>y & x-y<y & x-y=2y-x & x’=x-y & y’=y-(x-y) & x’=y’}

= {(s,s’)| 2x=3y & x-y=2y-x & x’=x-y & y’=y-(x-y) & x’=y’}

= {(s,s’)| 2x=3y & x’=x-y & y’=2y-x}

Path condition : condition under which this path is taken: 2x=3y. x=12; y=8.

x’= 12-8=4. y’= 16-12=4.

x’=y’. x’=gcd(x,y)=y’.

p3: (x!=y? true); (x>y? true) ; x=x-y ;

(x !=y ? true) ; (x>y ? false) ; y=y-x ;

(x!=y? true); (x>y? true) ; x=x-y ;

(x !=y ? false)

[p3] = {(s,s’)| x>y & x’=x-y & y’=y} \* {(s,s’)| x<y & x’=x & y’=y-x} \* {(s,s’)| x>y & x’=x-y & y’=y} \* {(s,s’)| s’=s & x=y}

= {(s,s’)| x>y & x-y<y & x’=x-y & y’=2y-x} \* {(s,s’)| x>y & x’=x-y & y’=y} \* {(s,s’)| s’=s & x=y}

= {(s,s’)| x>y & x<2y & 2x>3y & x’=2x-3y & y’=2y-x} \* {(s,s’)| s’=s & x=y}

= {(s,s’)| x>y & x<2y & 2x>3y & x’=2x-3y & y’=2y-x & x’=y’}

= {(s,s’)| x>y & x<2y & 2x>3y & 2x-3y=2y-x & x’=2x-3y & y’=2y-x & x’=y’}

= {(s,s’)| 3x=5y & x’=2x-3y & y’=2y-x }

Path condition : 3x=5y.

Test data : x=10. y=6.

x’= 20-18=2. y’=12-10=2. 2=gcd(10,6).

[read(x)] = {(s,s’)| length(is)>0 & x’=head(is) & is’=tail(is) & \_(s’)=\_(s)}

[read(x); read(y)] = {(s,s’)| length(is)>0 & x’=head(is) & is’=tail(is) & \_(s’)=\_(s)}

* {(s,s’)| length(is)>0 & y’=head(is) & is’=tail(is) & \_(s’)=\_(s)}

= {(s,s’)| length(is)>0 & length(tail(is))>0 & x’=head(is) & y’=(head(tail(is)) & is’=(tail(tail(is)) & \_(s’)=\_(s)}

= {(s,s’)| length(is)>1 & x’=head(is) & y’=(head(tail(is)) & is’=(tail(tail(is)) & \_(s’)=\_(s)}

Test data to satisfy the branch coverage criterion of the gcd program:

{int x, y; read(x); read(y);

while (x!=y) {if (x>y) {x=x-y ;} else {y=y-x ;}}

|  |  |  |
| --- | --- | --- |
| Condition | x | y |
| (x !=y) ? True | 5 | 5 |
| (x !=y) ? False | 15 | 5 |
| (x>y ? True) |  |  |
| (x>y ? False) |  |  |