In[1]:=
```
f[x_] := 5 * x^5 - 21 * x^4 + 23 * x^3 - 37 * x^2 + 77 * x - 7
g[x_] := 10 * x^4 - 42 * x^3 + 56 * x^2 - 26 * x + 2

(*
f = 5*x^5 - 21*x^4 + 23*x^3 - 37*x^2 + 77*x - 7
g = 10*x^4 - 42*x^3 + 56*x^2 - 26*x + 2
*)
```

In[3]:=
```
Print["f(x) = ", f[x]]
Print["g(x) = ", g[x]]
```

$f(x) = -7 + 77\,x - 37\,x^2 + 23\,x^3 - 21\,x^4 + 5\,x^5$

$g(x) = 2 - 26\,x + 56\,x^2 - 42\,x^3 + 10\,x^4$

In[5]:=
```
myGCD[aa_, bb_] := Module[{a = aa, b = bb, x0 = 1, xx = 0, y0 = 0, yy = 1, q, r},
  While[Not[SameQ[b, 0]],
    q = PolynomialQuotient [a, b, x];
    r = PolynomialRemainder [a, b, x];
    {a, b} = {b, r};
    {x0, xx} = {xx, (x0 - xx * q) // ExpandAll};
    {y0, yy} = {yy, (y0 - yy * q) // ExpandAll};
  ];
  {a, x0, y0}
];
```

In[6]:=
```
sols := myGCD[f[x], g[x]]
Print["myGCD(f(x), g(x)) = ", Simplify[sols〚1〛]]
```

$\text{myGCD}(f(x),\ g(x)) = 128 \times (1 - 11\,x + 5\,x^2)$

In[8]:=
```
coeff := CoefficientList [sols〚1〛, x] // Last
Print["C = ", coeff]
If[
  Simplify[sols [[1]]] === Simplify[sols〚2〛 * f[x] + sols〚3〛 * g[x]],
  Print["GCD(f(x), g(x)) = ", Simplify[sols〚1〛 / coeff]];
  Print["GCD(f(x), g(x)) = u * f(x) + v * g(x)"];
  Print["u = ", Simplify[sols〚2〛 / coeff]];
  Print["v = ", Simplify[sols〚3〛 / coeff]];
]
```

$$C = 640$$

$$\text{GCD}(f(x),\ g(x)) = \frac{1}{5} - \frac{11\,x}{5} + x^2$$

$$\text{GCD}(f(x),\ g(x)) = u * f(x) + v * g(x)$$

$$u = \frac{1}{320} \times (-9 + x)$$

$$v = \frac{1}{640} \times (1 + 9\,x - x^2)$$

In[11]:=