Лабораторная работа №5
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Вариант №3

In[1]:=
```
f = 126 * x^6 - 54 * x^5 - 28 * x^3 + 12 * x^2 + 14 * x - 6
g = -42 * x^5 + 39 * x^4 - 9 * x^3 - 189 * x + 81
```

Out[1]= $-6 + 14\,x + 12\,x^2 - 28\,x^3 - 54\,x^5 + 126\,x^6$

Out[2]= $81 - 189\,x - 9\,x^3 + 39\,x^4 - 42\,x^5$

In[3]:=
```
f // TraditionalForm
g // TraditionalForm
```

Out[3]//TraditionalForm=

$$126\,x^6 - 54\,x^5 - 28\,x^3 + 12\,x^2 + 14\,x - 6$$

Out[4]//TraditionalForm=

$$-42\,x^5 + 39\,x^4 - 9\,x^3 - 189\,x + 81$$

In[5]:=
```
myBezoutPoly[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};

              ];
              {x0, y0, a}
         ];
```

In[6]:=
```
PolynomialGCD[f, g]
```

Out[6]= $-3 + 7\,x$

In[7]:=
```
PolynomialExtendedGCD [f, g, x]
```

Out[7]=
$$\left\{-3+7\,x,\left\{\frac{2\,936\,837\,515\,843+2\,333\,758\,624\,029\,x-11\,521\,571\,632\,207\,x^2+11\,990\,059\,715\,074\,x^3}{4\,166\,528\,393\,172\,404},\right.\right.$$
$$\left.\left.\frac{1}{6\,249\,792\,589\,758\,606}\left(-231\,147\,484\,341\,151+259\,306\,513\,781\,x-1\,932\,805\,184\,877\,x^2-24\,869\,437\,986\,015\,x^3+53\,955\,268\,717\,833\,x^4\right)\right\}\right\}$$

In[8]:=
```
{myU, myV, myGCD} = myBezoutPoly [f, g]
{wolframGCD , {wolframU , wolframV}} = PolynomialExtendedGCD [f, g, x]
```

Out[8]=
$$\left\{-\frac{562\,474\,997\,414}{29\,199\,662\,027\,163}-\frac{49\,663\,432\,138\,x}{3\,244\,406\,891\,907}+\frac{2\,206\,657\,991\,486\,x^2}{29\,199\,662\,027\,163}-\frac{2\,208\,196\,x^3}{28\,078\,299},\right.$$
$$\frac{88\,540\,601\,892\,796}{87\,598\,986\,081\,489}-\frac{99\,326\,864\,276\,x}{87\,598\,986\,081\,489}+\frac{82\,261\,925\,588\,x^2}{9\,733\,220\,675\,721}+\frac{1\,058\,465\,629\,660\,x^3}{9\,733\,220\,675\,721}-\frac{2\,208\,196\,x^4}{9\,359\,433},$$
$$\left.\frac{797\,990\,367\,029\,992}{9\,733\,220\,675\,721}-\frac{5\,585\,932\,569\,209\,944\,x}{29\,199\,662\,027\,163}\right\}$$

Out[9]=
$$\left\{-3+7\,x,\left\{\frac{2\,936\,837\,515\,843+2\,333\,758\,624\,029\,x-11\,521\,571\,632\,207\,x^2+11\,990\,059\,715\,074\,x^3}{4\,166\,528\,393\,172\,404},\right.\right.$$
$$\left.\left.\frac{1}{6\,249\,792\,589\,758\,606}\left(-231\,147\,484\,341\,151+259\,306\,513\,781\,x-1\,932\,805\,184\,877\,x^2-24\,869\,437\,986\,015\,x^3+53\,955\,268\,717\,833\,x^4\right)\right\}\right\}$$

In[10]:=
```
FullSimplify [myGCD == f * myU + g * myV]
```

Out[10]=
```
True
```

```
(*Функция myBezoutPoly работает корректно.*)
```

In[13]:=
```
normalizePoly [poly_] := poly / Coefficient [
poly
, x
, Exponent [poly , x]
] // ExpandAll
```

In[14]:=
```
normalizePoly [myGCD]
```

Out[14]=
$$-\frac{3}{7}+x$$

In[15]:=
```
normalizePoly [myGCD] == normalizePoly [wolframGCD ] // FullSimplify
```

Out[15]=
```
True
```

```
(*Результаты совпали => коэффициенты найдены верно.*)
```