Question 4C:

```
> restart:
> printf("\nInput Polynomials:"\n):
  a_bar := 58*x^4 - 415*x^3 - 111*x + 213;
  b_bar := 69*x^3 - 112*x^2 + 413*x + 113;
```

Input Polynomials:

$$a\_bar := 58\,x^4 - 415\,x^3 - 111\,x + 213$$

$$b\_bar := 69\,x^3 - 112\,x^2 + 413\,x + 113 \quad \textbf{(1)}$$

```
> res := resultant(a_bar, b_bar, x):
  printf("\nThe resultant is: %d.\n", res);
```

The resultant is: 232546626971939784.

```
> printf("\nFactors of the resultant:\n"):
  fac_res := ifactor(res);
```

Factors of the resultant:

$$fac\_res := (2)^3\,(3)\,(7)\,(196648119467)\,(7039) \quad \textbf{(2)}$$

```
> printf("\nIf the prime number divides the resultant it is an
  unlucky prime.\n"):
  divide(res, 2);
  divide(res, 3);
  divide(res, 7);
  divide(res, 196648119467);
  divide(res, 7039);
```

If the prime number divides the resultant it is an unlucky prime.

$$true$$
$$true$$
$$true$$
$$true$$
$$true \quad \textbf{(3)}$$

```
> printf("\nComputing GCD of the unlucky primes:\n"):

  g_One := Gcd(a_bar, b_bar) mod 2;
  g_Two := Gcd(a_bar, b_bar) mod 3;
  g_Three := Gcd(a_bar, b_bar) mod 7;
  g_Four := Gcd(a_bar, b_bar) mod 196648119467;
  g_Five := Gcd(a_bar, b_bar) mod 7039;
```

Computing GCD of the unlucky primes:

$$g\_One := x^3 + x + 1$$
$$g\_Two := x + 2$$
$$g\_Three := x + 5$$
$$g\_Four := x + 51402852970$$
$$g\_Five := x + 5407 \quad \textbf{(4)}$$