Question 3 (Part a):

```
> restart:
> `mod` := mods:
> check_res := proc(actual_det::polynom, computed_mod_det::polynom)

  local res:
  if actual_det = computed_mod_det then
      return 'PASS':
  else
      return 'FAIL':
  fi:

  end proc:

> mod_det_algo := proc(A::Matrix)

  local B_i, x_val, det_B_i, p, i, det_comp, j, sub_B_i, res:
  p := [101, 103, 107, 109]:
  x_val := [0, 1, 2, 3, 4, 5, 6, 7]:
  det_B_i := [seq(0, i = 1..nops(x_val))]:
  det_comp := [seq(0, i = 1..4)]:

  for i from 1 to nops(p) do:

      B_i := A mod p[i]:
      for j from 1 to nops(x_val) do:
          sub_B_i := Eval(B_i, x = x_val[j]) mod p[i]:
          det_B_i[j] := Det(sub_B_i) mod p[i]:
      od:

      det_comp[i] := Interp(x_val, det_B_i, x) mod p[i]:
  od:

  res := chrem(det_comp, p):
  return res:
  end proc:

> P := () -> randpoly(x, degree = 2, dense):
  A := Matrix(3, 3, P):
  A;
```

$$\begin{bmatrix} -7x^2+22x-55 & -94x^2+87x-56 & 97 \\ -73x^2-4x-83 & -10x^2+62x-82 & 80x^2- \\ -17x^2-75x-10 & -7x^2-40x+42 & -50x^2- \end{bmatrix}$$

```
> actual_det := LinearAlgebra[Determinant](A);
```

$$actual\_det := 463520x^6 - 75964x^5 - 539985x^4 + 937816x^3 - 455486x^2 + 55203x - 224262 \quad (2)$$

```
> computed_mod_det := mod_det_algo(A);
```

$$computed\_mod\_det := 463520x^6 - 75964x^5 - 539985x^4 + 937816x^3 - 455486x^2 + 55203x - 224262 \quad (3)$$

```
> check_res(actual_det, computed_mod_det);
```

$$PASS \quad (4)$$