

**Example 2.8.1** multiplication table for  $GF(9) = \mathbb{Z}_3[y]/(y^2 + 1)$

	0	1	2	y	y+1	y+2	2y	2y+1	2y+2
0	0	0	0	0	0	0	0	0	0
1	0	1	2	y	y+1	y+2	2y	2y+1	2y+2
2	0	2	1	2y	2y+2	2y+1	y	y+2	y+1
y	0	y	2y	2	y+2	2y+2	1	y+1	2y+1
y+1	0	y+1	2y+2	y+2	2y	1	2y+1	2	y
y+2	0	y+2	2y+1	2y+2	1	y	y+1	2y	2
2y	0	2y	y	1	2y+1	y+1	2	2y+2	y+2
2y+1	0	2y+1	y+2	y+1	2	2y	2y+2	y	1
2y+2	0	2y+2	y+1	2y+1	y	2	y+2	1	2y

Powers of elements of  $GF(9) = \mathbb{Z}_3[y]/(y^2 + 1)$

a	a <sup>1</sup>	a <sup>2</sup>	a <sup>3</sup>	a <sup>4</sup>	a <sup>5</sup>	a <sup>6</sup>	a <sup>7</sup>	a <sup>8</sup>	ord(a)
1	1	1	1	1	1	1	1	1	1
2	2	1	2	1	2	1	2	1	2
y	y	2	2y	1	y	2	2y	1	4
y+1	y+1	2y	2y+1	2	2y+2	y	y+2	1	8
y+2	y+2	y	2y+2	2	2y+1	2y	y+1	1	8
2y	2y	2	y	1	2y	2	y	1	4
2y+1	2y+1	y	y+1	2	y+2	2y	2y+2	1	8
2y+2	2y+2	2y	y+2	2	y+1	y	2y+1	1	8