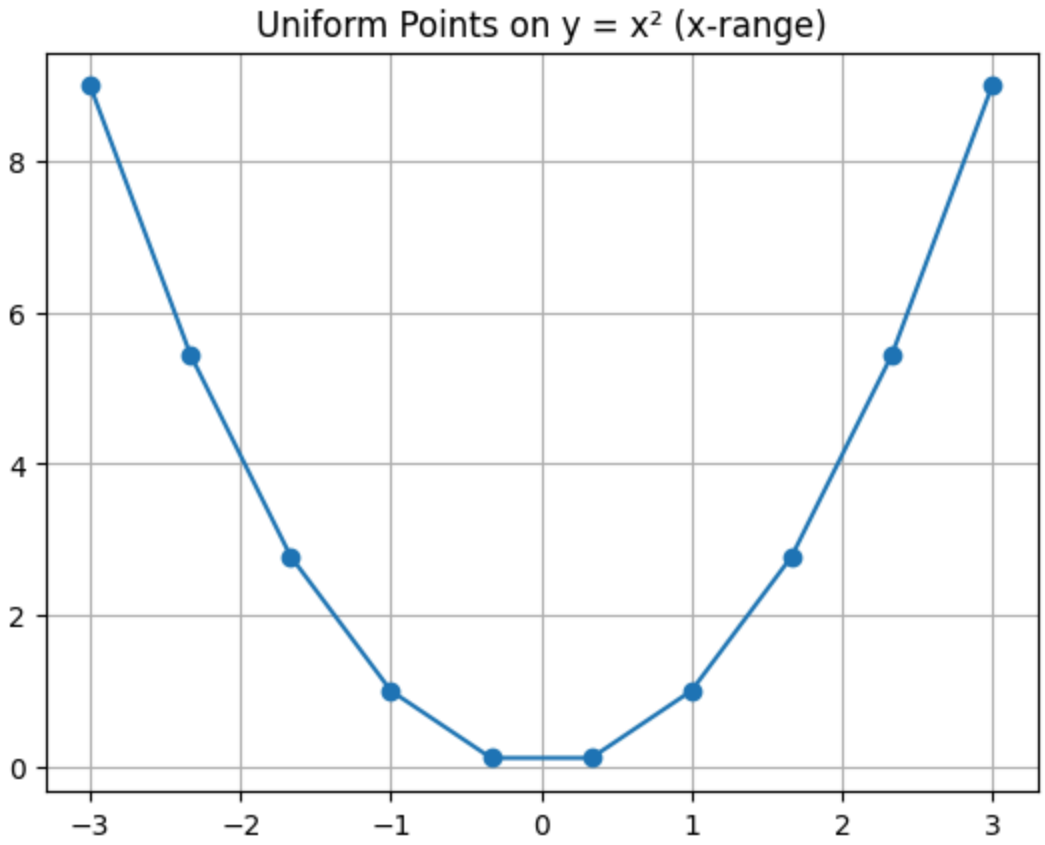
Amit Divekar | Practical 11

Uniform Points on Parabolas

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
```

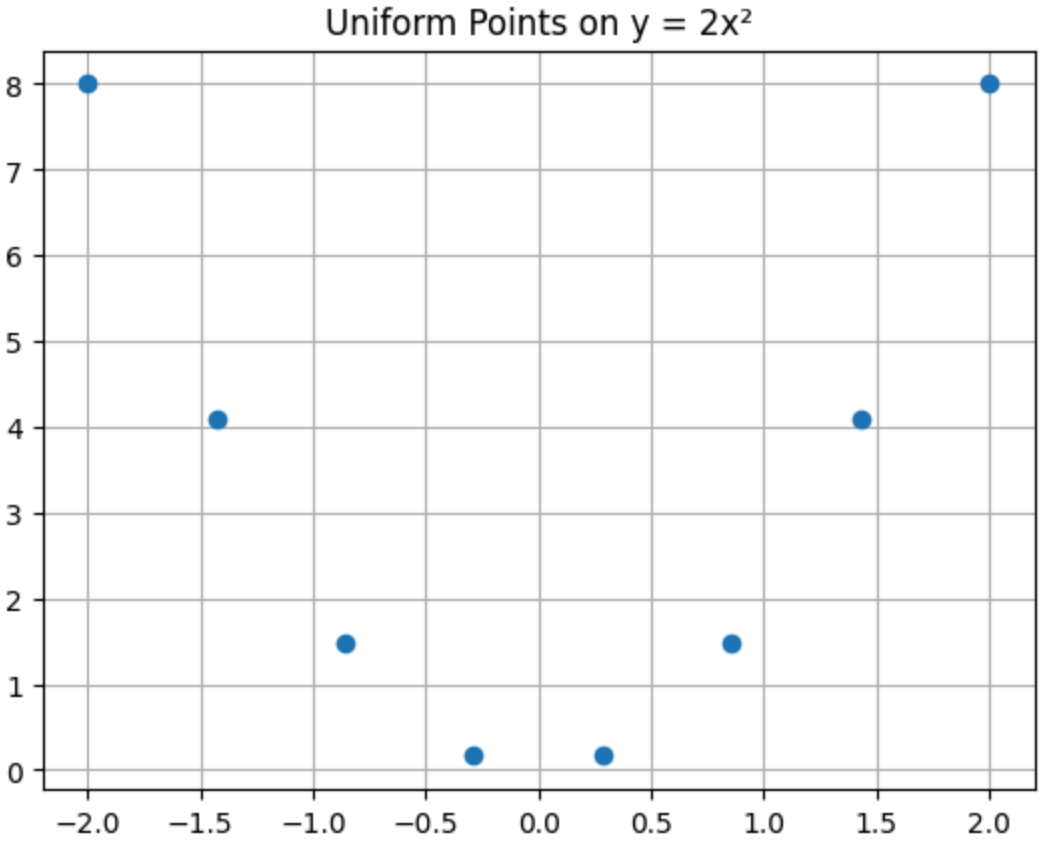
Q1. Generate and plot n uniformly spaced points on the parabola $y=x^2$ for $x \in [-3,3]$

In [2]:
```
import numpy as np
import matplotlib.pyplot as plt
n = 10
x = np.linspace(-3, 3, n)
y = x**2
plt.plot(x, y, 'o-')
plt.title("Uniform Points on y = x² (x-range)")
plt.grid()
plt.show()
```



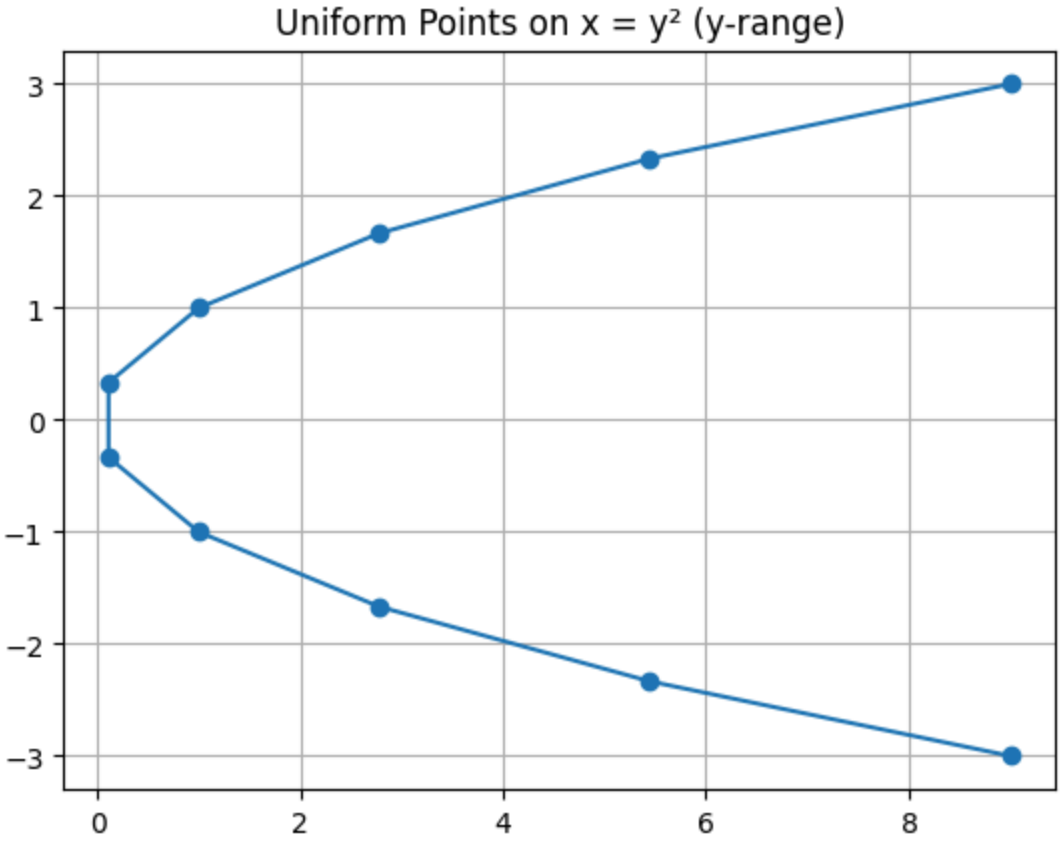
Q2. Generate and plot uniformly spaced points on the parabola $y=2x^2$ for $x \in [-2,2]$

In [3]:
```
import numpy as np
import matplotlib.pyplot as plt
n=8
x = np.linspace(-2, 2, n)
y = 2 * x**2
plt.plot(x, y, 'o')
plt.title("Uniform Points on y = 2x²")
plt.grid()
plt.show()
```



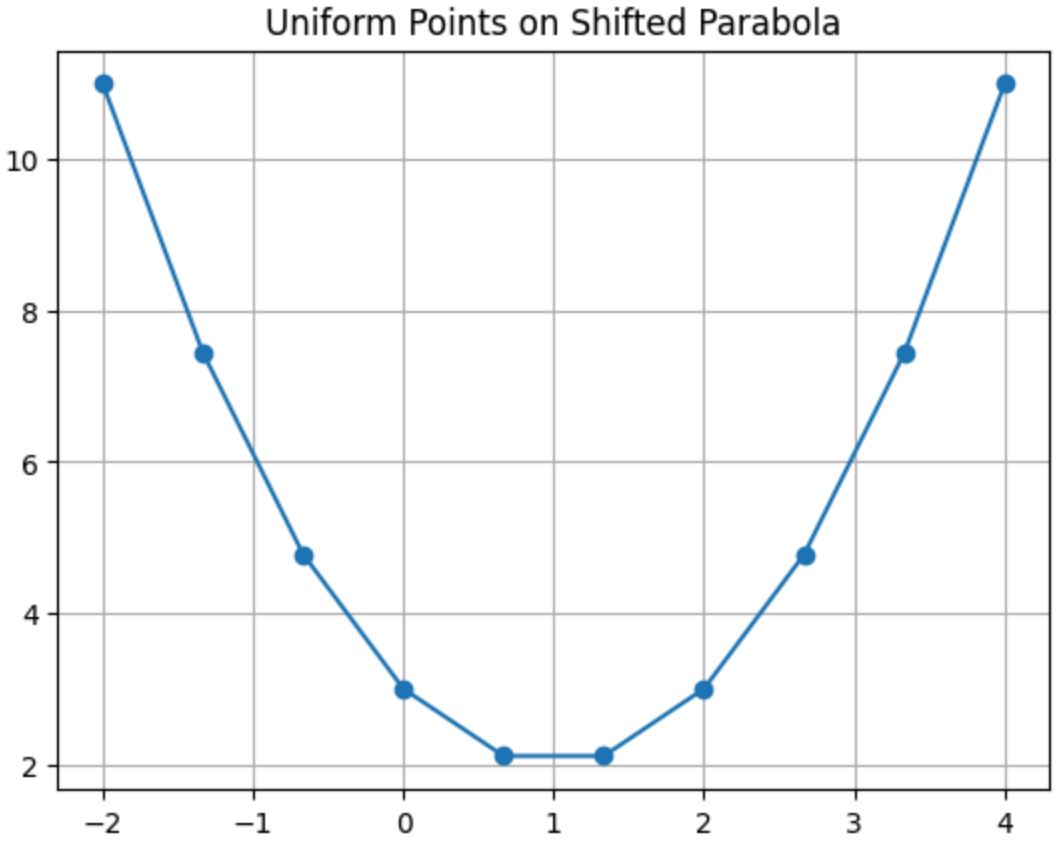
Q3. Generate and plot uniformly spaced points on the parabola $x = y^2$ for $y \in [-3,3]$

In [4]:
```
import numpy as np
import matplotlib.pyplot as plt
n = 10
y = np.linspace(-3, 3, n)
x = y**2
plt.plot(x, y, 'o-')
plt.title("Uniform Points on x = y² (y-range)")
plt.grid()
plt.show()
```



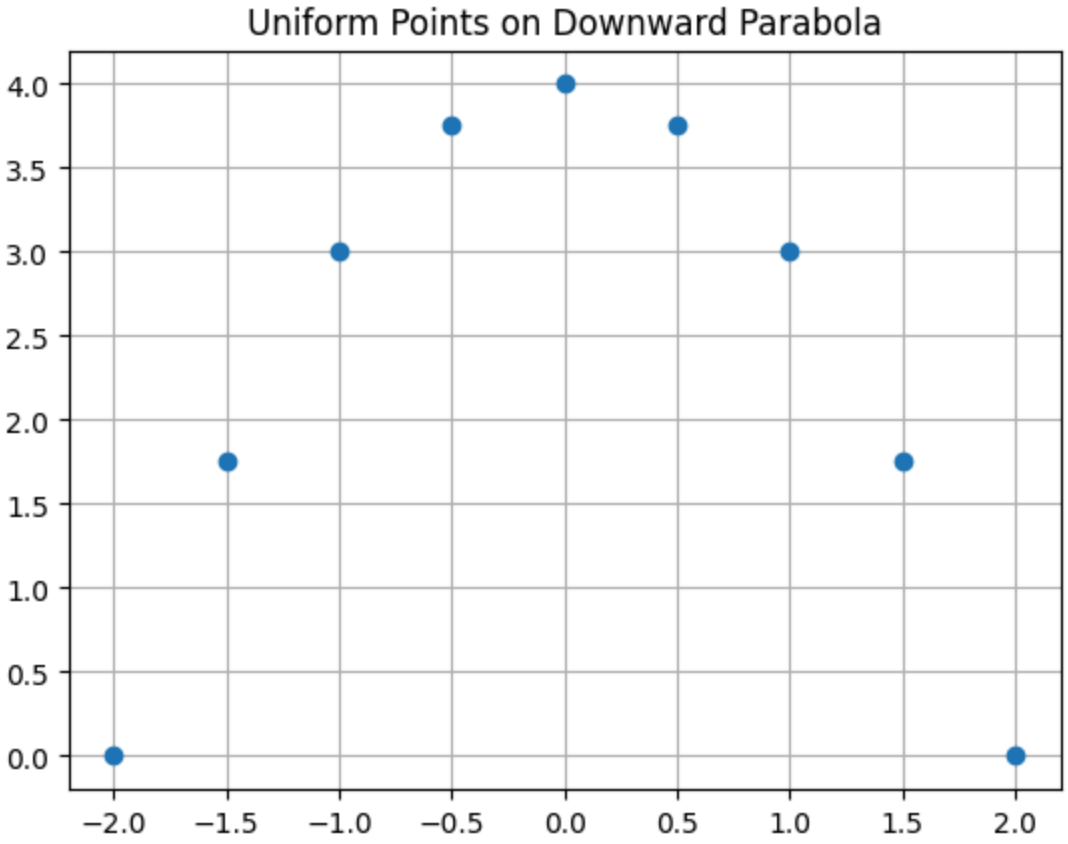
Q4. Generate uniformly spaced points on the parabola $y = (x-1)^2+2$ for $x \in [-2,4]$

In [5]:
```
import numpy as np
import matplotlib.pyplot as plt
n = 10
x = np.linspace(-2, 4, n)
y = (x - 1)**2 + 2
plt.plot(x, y, 'o-')
plt.title("Uniform Points on Shifted Parabola")
plt.grid()
plt.show()
```



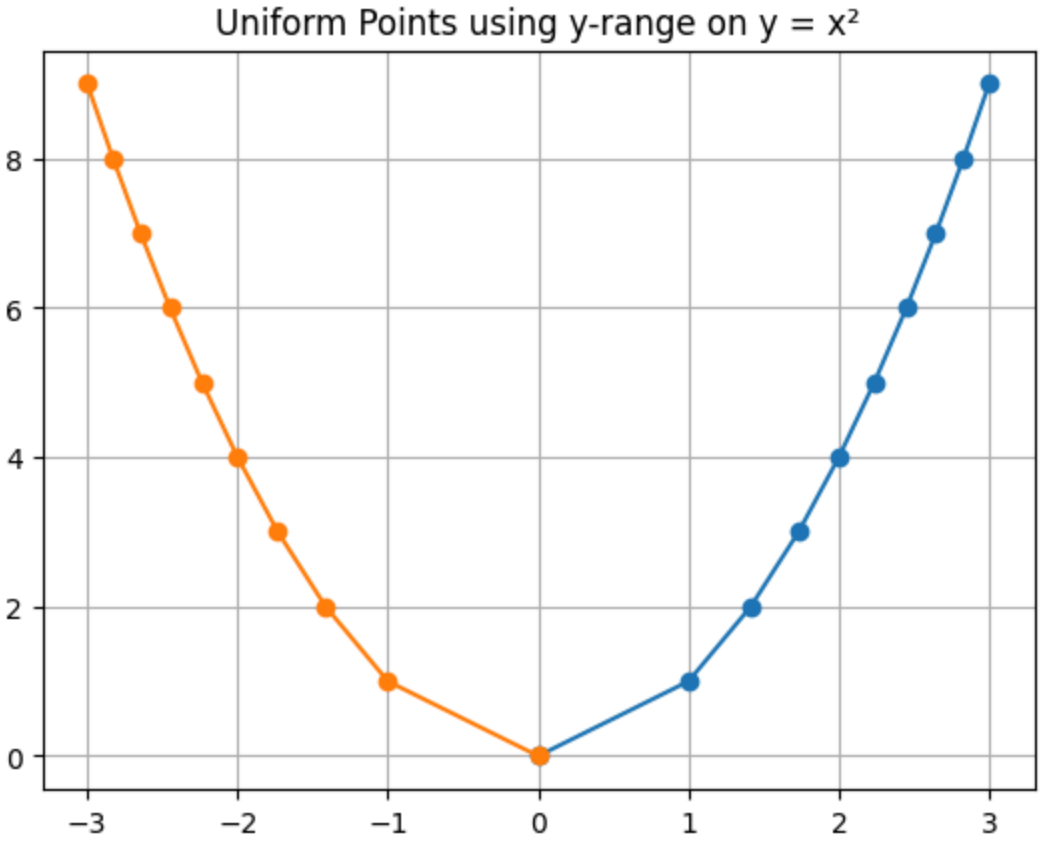
Q5. Generate and plot uniformly spaced points on the parabola $y = -x^2+4$ for $x \in [-2,2]$

In [6]:
```
import numpy as np
import matplotlib.pyplot as plt
n=9
x = np.linspace(-2, 2, n)
y = -x**2 + 4
plt.plot(x, y, 'o')
plt.title("Uniform Points on Downward Parabola")
plt.grid()
plt.show()
```



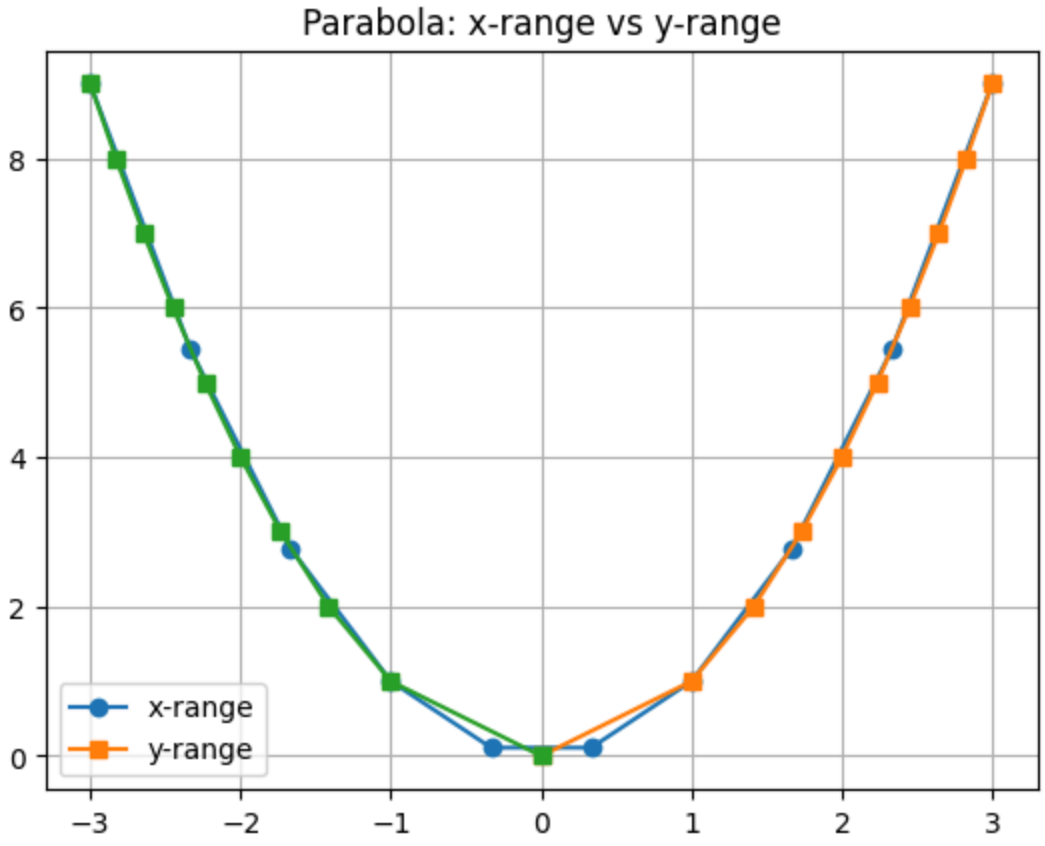
Q6. Generate and plot uniformly spaced points on the parabola $y=x^2$ for $y \in [0,9]$

In [7]:
```
import numpy as np
import matplotlib.pyplot as plt
n = 10
y = np.linspace(0, 9, n)
x = np.sqrt(y)
plt.plot(x, y, 'o-')
plt.plot(-x, y, 'o-')
plt.title("Uniform Points using y-range on y = x²")
plt.grid()
plt.show()
```



Q7. Generate and plot uniformly spaced points on the parabola y=x² using both x-range and y-range methods.

In [8]:
```
import numpy as np
import matplotlib.pyplot as plt
n = 10
x1 = np.linspace(-3, 3, n)
y1 = x1**2
y2 = np.linspace(0, 9, n)
x2 = np.sqrt(y2)
plt.plot(x1, y1, 'o-', label="x-range")
plt.plot(x2, y2, 's-', label="y-range")
plt.plot(-x2, y2, 's-')
plt.legend()
plt.title("Parabola: x-range vs y-range")
plt.grid()
plt.show()
```


Parabola: x-range vs y-range
x-range
y-range
8
6
4
2
0
−3
−2
−1
0
1
2
3