ENGR 285 — Homework 3

Problem 1

```
def int_sqrt(x):
    """
    Return the square root of an arbitrary positive number to the nearest whole
number
    """
    n = 1
    while n * n < x:
        n += 1
    previous = n - 1
    previous_squared = previous * previous
    if (n * n) - x <= x - previous_squared:
        return n
    else:
        return n - 1

test_input = [2, 3, 6, 7, 12, 13, 20, 21, 30, 31, 42]
print("Input | Output")
print("----- | ------")
for x in test_input:
    print(f"{x:5} | {int_sqrt(x):6}")
```

Output:

```
Input | Output
----- | ------
    2 |      1
    3 |      2
    6 |      2
    7 |      3
   12 |      3
   13 |      4
   20 |      4
   21 |      5
   30 |      5
   31 |      6
   42 |      6
```

Problem 2

```
import numpy as np
rng = np.random.default_rng()

def f(x):
    return np.exp(-x**2 / 2)

N = 100
count = 0
trials = 6
for i in range(trials):
    x_values = rng.random(N)
```

```
    y_values = rng.random(N)
    below = (y_values < f(x_values)).sum()
    integral = below / N
    print(f"Trial {i + 1}: {integral}")
```

Output:

```
Trial 1: 0.81
Trial 2: 0.87
Trial 3: 0.85
Trial 4: 0.83
Trial 5: 0.89
Trial 6: 0.92
```