

Nissan Logo Area - Magbutay (FINAL)

November 30, 2020

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[1]: import random
import numpy as np
import time
```

1 For the Circle

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[2]: def MC(func, a, b, n):

    f = func
    x = np.random.uniform(a, b, n)
    w = b - a

    return w * sum(f(x))/n
```

```
[3]: def area_circ_segment(x):
    return np.sqrt(R**2 - x**2) - x**0 * R * np.cos(theta/2)
```

```
[4]: Area_Circle = []

for i in range(100000):
    # Calculating for the outer radius
    R = 25
    h = 15
    theta = 2 * np.arccos(1-h/R)
    a = -R * np.sin(theta/2)
    b = R * np.sin(theta/2)
    A_outerrad = MC(func=area_circ_segment, a = a, b=b, n=100000)

    # Calculating for the inner radius
    R = 20
    h = 10
    theta = 2 * np.arccos(1 - h/R)
    a = -R * np.sin(theta/2)
    b = R * np.sin(theta/2)
    A_innerrad = MC(func = area_circ_segment, a = a, b = b, n=100000)
```

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Area_Circle.append(2*(A_outerrad - A_innerrad))
```

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[5]: mean_Circle = np.mean(Area_Circle)
sd_Circle = np.std(Area_Circle)
print(f'Circular portion is determined to be: {mean_Circle}mm^2 with a standard_
↳deviation of {sd_Circle}mm^2')
```

Circular portion is determined to be: 499.5052330561189mm² with a standard deviation of 0.705686929886594mm²

2 For the rectangle

```
[6]: def PointInRectangle(x,y, Cx, Cy):
    if (x < Cx) and (y < Cy):
        return True
    return False

def approxRectangleArea(Cx, Cy, points):
    x_enclosed = Cx + 0.01
    y_enclosed = Cy + 0.01
    pointsInside = 0
    for i in range(points):
        x = np.random.random() * x_enclosed
        y = np.random.random() * y_enclosed
        if PointInRectangle(x,y,Cx,Cy):
            pointsInside = pointsInside + 1
    return pointsInside / points * (Cx * Cy)
```

```
[7]: Area_Rectangle = []

for i in range(100000):
    vals = approxRectangleArea(Cx = 70, Cy = 20, points = 100000)
    Area_Rectangle.append(vals)

mean_Rectangle = np.mean(Area_Rectangle)
sd_Rectangle = np.std(Area_Rectangle)
print(f'Area of the rectangle is determined to be: {mean_Rectangle}mm^2 with a
↳standard deviation of {sd_Rectangle}mm^2')
```

Area of the rectangle is determined to be: 1399.1031879999998mm² with a standard deviation of 0.3510324153921341mm²

3 For the whole area

```
[8]: Area_Nissan_Logo = mean_Circle + mean_Rectangle
Area_Error = np.sqrt(sd_Circle**2 + sd_Rectangle**2)
print(f'The total area is determined to be: {Area_Nissan_Logo}mm^2 +-
      ↳{Area_Error}mm^2')
```

The total area is determined to be: 1898.6084210561187mm² +-
1.1203111625655mm²

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[ ]:
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