Example Calculations of Formulas in Python

1. Area of a Circle

Formula:

$$A = \pi r^2$$

Python Code:

```
def area_of_circle(radius):
    return math.pi * (radius ** 2)
```

2. Pythagorean Theorem

Formula:

$$c = \sqrt{a^2 + b^2}$$

Python Code:

```
def pythagorean_theorem(a, b):
    return math.sqrt(a**2 + b**2)
```

3. Compound Interest

Formula:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Python Code:

```
def compound_interest(P, r, n, t):
    return P * (1 + r/n)**(n*t)
```

4. Quadratic Formula (Bhaskara)

Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Python Code:

```
def bhaskara(a, b, c):
    delta = b**2 - 4*a*c
    x1 = (-b + cmath.sqrt(delta)) / (2 * a)
    x2 = (-b - cmath.sqrt(delta)) / (2 * a)
    return x1, x2
```

5. Linear Equation

Formula:

$$y = mx + b$$

Python Code:

```
def linear_equation(m, x, b):
    return m * x + b
```

6. Standard Deviation

Formula:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

Python Code:

```
def standard_deviation(data):
    mean = sum(data) / len(data)
    variance = sum((x - mean) ** 2 for x in data) / len(data)
    return math.sqrt(variance)
```

7. Volume of a Cylinder

Formula:

$$V = \pi r^2 h$$

Python Code:

```
def volume_of_cylinder(radius, height):
    return math.pi * (radius ** 2) * height
```

8. Simple Interest

Formula:

$$I = P \cdot r \cdot t$$

Python Code:

```
def simple_interest(P, r, t):
    return P * r * t
```

9. Surface Area of a Sphere

Formula:

$$A = 4\pi r^2$$

Python Code:

```
def surface_area_of_sphere(radius):
    return 4 * math.pi * (radius ** 2)
```

10. Volume of a Cone

Formula:

$$V = \frac{1}{3}\pi r^2 h$$

Python Code:

```
def volume_of_cone(radius, height):
    return (1/3) * math.pi * (radius ** 2) * height
```

11. Exponential Growth

Formula:

$$N(t) = N_0 e^{rt}$$

Python Code:

```
def exponential_growth(N0, r, t):
    return N0 * math.exp(r * t)
```

12. Distance Between Two Points

Formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Python Code:

```
def distance_between_points(x1, y1, x2, y2):
    return math.sqrt((x2 - x1) ** 2 + (y2 - y1) ** 2)
```

13. BMI (Body Mass Index)

Formula:

$$BMI = \frac{weight}{height^2}$$

Python Code:

```
def bmi(weight, height):
    return weight / (height ** 2)
```

14. Loan Payment Calculation

Formula:

$$M = P\frac{r(1+r)^n}{(1+r)^n - 1}$$

Python Code:

```
def loan_payment(P, r, n):
    return P * (r * (1 + r) ** n) / ((1 + r) ** n - 1)
```

15. Gravitational Force Between Two Masses

Formula:

$$F = G\frac{m_1 m_2}{r^2}$$

where G is the gravitational constant.

Python Code:

```
def gravitational_force(m1, m2, r):
    G = 6.67430e-11  # Gravitational constant
    return G * (m1 * m2) / (r ** 2)
```

16. Profit Calculation

Formula:

$$\text{Profit} = \text{Revenue} - \text{Cost}$$

Python Code:

```
def profit(revenue, cost):
    return revenue - cost
```

17. Celsius to Fahrenheit Conversion

Formula:

$$F = \frac{9}{5}C + 32$$

Python Code:

```
def celsius_to_fahrenheit(celsius):
    return (9/5) * celsius + 32
```

18. Interest Rate Calculation

Formula:

$$r = \frac{I}{P \cdot t}$$

Python Code:

```
def interest_rate(I, P, t):
    return I / (P * t)
```

19. Future Value of an Investment

Formula:

$$FV = P\left(1 + \frac{r}{n}\right)^{nt}$$

Python Code:

```
def future_value(P, r, n, t):
    return P * (1 + r/n)**(n*t)
```

20. Angle Conversion (Degrees to Radians)

Formula:

$$\text{radians} = \text{degrees} \times \frac{\pi}{180}$$

Python Code:

```
def degrees_to_radians(degrees):
    return degrees * (math.pi / 180)
```