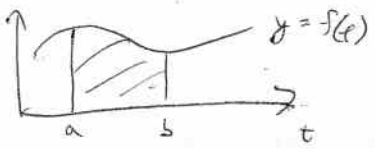
Please write an outline of the main contents of the lecture.

- f continuous on $[a,b]$

Ex.



- Definite Integral

$$F(x) = \int_a^x f(x)\,dt \quad , \quad x \text{ in interval } [a,b]$$

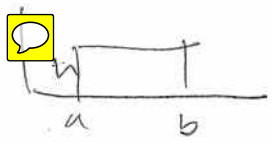
- Fund. theorem of calculus
  - $\frac{dF}{dx} = \frac{d}{dx}\int_a^x f(t)\,dt = f(x)$
  - Any continuous function f has antiderivative $F(x)$
  - Example: $f(t)$

$$\frac{d}{dx}\left(\int_{\sqrt{4}}^{x^2}\left(\frac{\cos^2 t}{\ln(t-\sqrt{t})}\right)dt\right)$$

Please write an outline of the main contents of the lecture.

Uniform Distribution

- $X \sim Unif(a,b)$: uniform random variable with lower limit a and upper limit b



- equally likely to take any value from a to b

area $= (b-a)h$

- PDF $= \frac{1}{b-a}$, or $f_X(x) = \frac{1}{b-a}$, $a \le x \le b$

- CDF: $F(x) = \begin{cases} 0 & \text{if } x < a \\ \frac{x-a}{b-a} & \text{if } a \le x \le b \\ 1 & \text{if } x \ge b \end{cases}$

- CDF:
  - $F_X(x) = P(X \le x)$
  - when $x < a$
    $F_X(x) = P(X < X) = 0$
  - when $X \in [a,b]$
    $F_X(x) = \int_{-\infty}^{x} f(x)\,dx = \frac{x-a}{b-a}$
  - when $x > b$
    $F_X(x) = 1$

Please write an outline of the main contents of the lecture.

Euler's formula : $e^{ix} = \cos(x) + i\sin(x)$

1st Example : $\sin^2(x) + \cos^2(x) = 1$

$e^{ix} = \cos(x) + i\sin(x)$

$e^{-ix} = e^{i(-x)} = \ldots = \cos(x) - i\sin(x)$

$e^{ix} \cdot e^{-ix} = 1 = \cos^2 x + \sin^2(x)$

2nd Example : Angle Sum Formula

$e^{ia} = \cos a + i\sin a$, $e^{ib} = \cos b + i\sin b$

$e^{ia} e^{ib} = (\cos a + i\sin a)(\cos b + i\sin b)$

$e^{i(a+b)} = \ldots = \cos(a+b) + i\sin(a+b)$

Angle Sum Formulas

$$\begin{cases} \cos(a+b) = \cos a \cos b - \sin a \sin b \\ \sin(a+b) = \cos a \sin b \end{cases}$$

Double Angle : let $a = x$, $b = x$