

# Calculus II

## Daily Quiz 2-2

October 8, 2025

Please write your name on the top of the paper.

i) Fill out the following table:

| Function $f(x)$   | Ant-Derivative $\int f(x)dx$ |
|-------------------|------------------------------|
| $c$               |                              |
| $x^n$             |                              |
| $e^x$             |                              |
| $1/x$             |                              |
| $\sin x$          |                              |
| $\cos x$          |                              |
| $\sec^2 x$        |                              |
| $1/\sqrt{1-x^2}$  |                              |
| $-1/\sqrt{1-x^2}$ |                              |
| $1/(1+x^2)$       |                              |

ii) Evaluate:

$$\int_{-1}^2 3x^2 dx$$

iii) Evaluate:

$$\int_0^4 3x^3 + 2x + 1 dx$$

iv) Evaluate:

$$\int_{-\pi/6}^{\pi/2} \cos(2x) dx$$

v) Evaluate:

$$\int_0^{2\pi} x^2 \sin(x^3) dx$$

vi) Evaluate:

$$\int_1^2 \frac{1}{x^2} dx$$

vii) Evaluate:

$$\int_1^{e^{100}} \frac{2}{x}$$

viii) Evaluate:

$$\int \tan x dx$$

**Hint:** write  $\tan x = \sin x / \cos x$ , and note that  $\frac{d}{dx} \cos x = -\sin x$ . What function satisfies  $d/dx f(x) = 1/x$ ? Use chain rule.

ix) Evaluate:

$$\int \cos x e^{\sin x} dx$$

x) Evaluate:

$$\int e^x \cos(e^x) dx$$

xi) Evaluate:

$$\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$$

xii) Evaluate:

$$\int \frac{e^x}{1+(e^x)^2} dx$$

xiii) Evaluate:

$$\int \frac{2xe^{x^2}}{1+(e^{x^2})^2} dx$$

xiv) Evaluate:

$$\int \cot x dx$$

xv) If  $a$  is a real number evaluate:

$$\int a^x dx$$

xvi) Evaluate:

$$\int \sin(x) \cos x dx$$

xvii) Evaluate:

$$\int e^{\sin^2 x} \sin x \cos x dx$$

xviii) Evaluate:

$$\int \frac{1}{e^x} dx$$

**Hint:** write  $1/e^x$  as  $e^{-x}$ .

xix) Evaluate:

$$\int \tan(e^{\cos x}) e^{\cos x} \sin x dx$$

xx) Evaluate:

$$\int_0^t \sin x dx$$

(write this as a function of  $t$ !)

xxi) Let the velocity of a particle relative to zero on the real number line be given by  $v(t) = \sin(\pi t)$  ( $t$  has units seconds,  $v$  has units meters per second). Find the total change in distance from the origin over the interval  $[1, 3/2]$ . Find the total distance traveled over the interval  $[1, 3/2]$  (**hint:** find out where the function is negative, and split the integral up into pieces based on this.) If at  $t = 3$ , we know that  $x(3) = 4$  find the function  $x(t)$ .

- xxii) Let the rate at which the volume of water changes in a tank be given by the function  $a(t) = e^{\sin(\pi t)} \cos(\pi t)$  (  $t$  has units hours after 12pm, and  $a(t)$  has units meters cubed per hour). If at 3pm we know the volume of the tank is 120 cubic meters, find the volume of the tank as a function of time  $V(t)$ .