

The background of the image is a soft-focus, monochromatic landscape. In the center, a dark, craggy rock formation rises from a misty base. Several tall evergreen trees are scattered across the rocks. At the very top of the central peak, there's a small, weathered stone structure, possibly a ruin or a look-out point. The overall mood is mysterious and ethereal, with heavy fog obscuring the lower half of the scene.

RE 2708

# INTRODUCTION



**DR. CRISTIAN BADARINZA**  
ASSISTANT PROFESSOR

## A FEW WORDS ABOUT ME

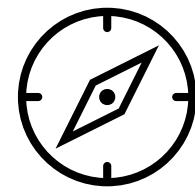
I am an Assistant Professor at the National University of Singapore, a Research Fellow of the Institute of Real Estate Studies, and a Network Associate of the Centre for Economic Policy Research, London. My research interests are in the areas of real estate finance, household finance and financial economics. Previously, I have been a Postdoctoral Fellow at Saïd Business School, University of Oxford, a Research Assistant in the Monetary Policy Research Division of the European Central Bank in Frankfurt am Main, and I have obtained a PhD and an MSc in Economics from Goethe University. I am also part of the *Initiative for International Comparative Household Finance*. This research initiative connects academics from around the world which seek to explore how household financial markets (such as mortgage, pension, and risky asset markets) are set up, and whether there are international best practices that can be established.

# VISUAL BASIC

The most heavily used computational solution in **global business today**

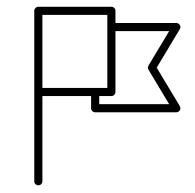
## TRULY GLOBAL

For decades, most enterprise processes were written in Visual Basic, all around the world.



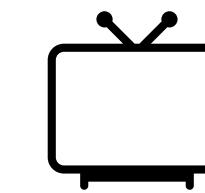
## RELIABLE

Backed by the reliable experience, competence and inter-operability of the Microsoft ecosystem of office-grade products.



## SIMPLE

Once you are familiar with some basic concepts, almost anything can be coded up in Visual Basic.



## OBJECT-ORIENTED

One of the first computer languages allowing programmers to work with objects and containers of functions.

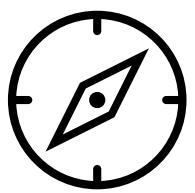


# PYTHON

The future.

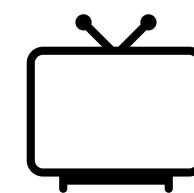
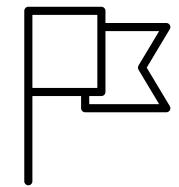
## OPEN-SOURCE

Of course, the major benefit is that Python is free. But more importantly, open source means that it's constantly improving.



## THE LANGUAGE OF AI & MACHINE LEARNING

Most of the applications powering the technological innovation that you see around us (FinTech, self-driving cars, face recognition) are built in Python.



## UNLIMITED CREATIVITY

Python is purely a programming language, not a platform. Therefore, there are no limits as to how and where it can be deployed.



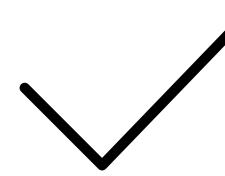
## POWERING DATA SCIENCE

Python is slowly becoming the preferred platform for data analysis in academic research.

START WITH WHY?

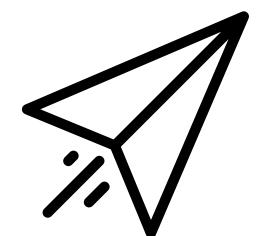
# OUR GOALS

So what are we trying to achieve in this module?



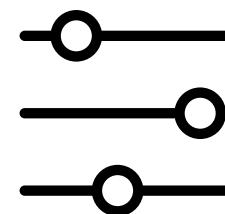
## PRECISION

Both in academia and business, we need clear, precise answers to our questions.



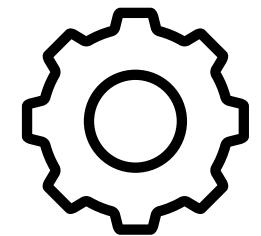
## AUTOMATION

The more we automate, the more we have time for the things that really matter in life.



## FLEXIBILITY

The world is in constant change. We need to be able to quickly adapt to that change.



## DISCIPLINE

We do everything step by step. A strong foundation is half of the achievement.

HONESTLY:

# ARE YOU A PROGRAMMER?

Can you



READ?

Computer code

Can you



WRITE?

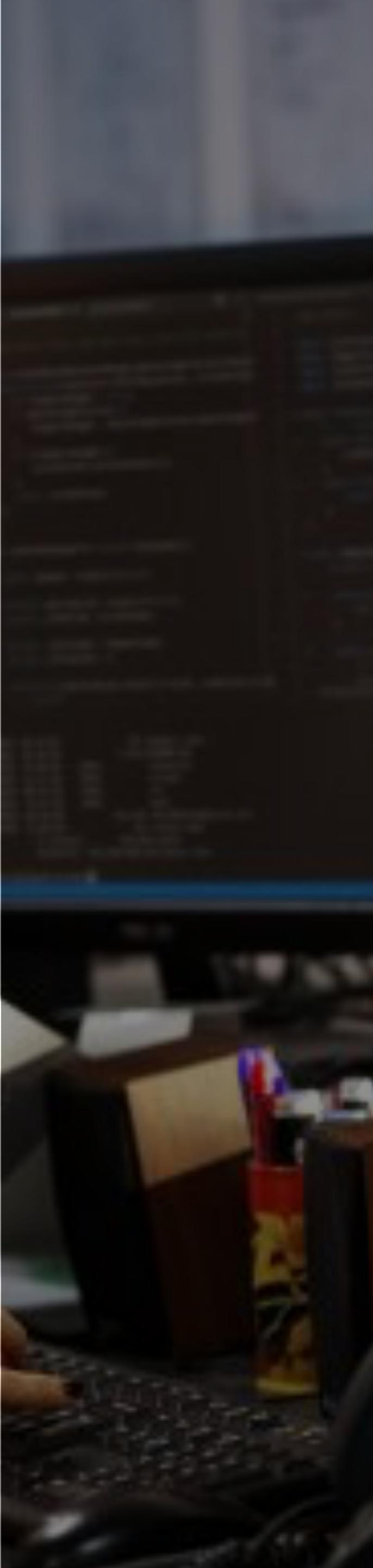
Computer code

Can you



THINK?

Like a computer



# HUMAN THINKING

How do we interact with our environment? How do we take decisions?



## INPUT

Humans get signals from their environment, using sensorial experiences. We use our eyes and ears to collect information about the world.

## PROCESSING

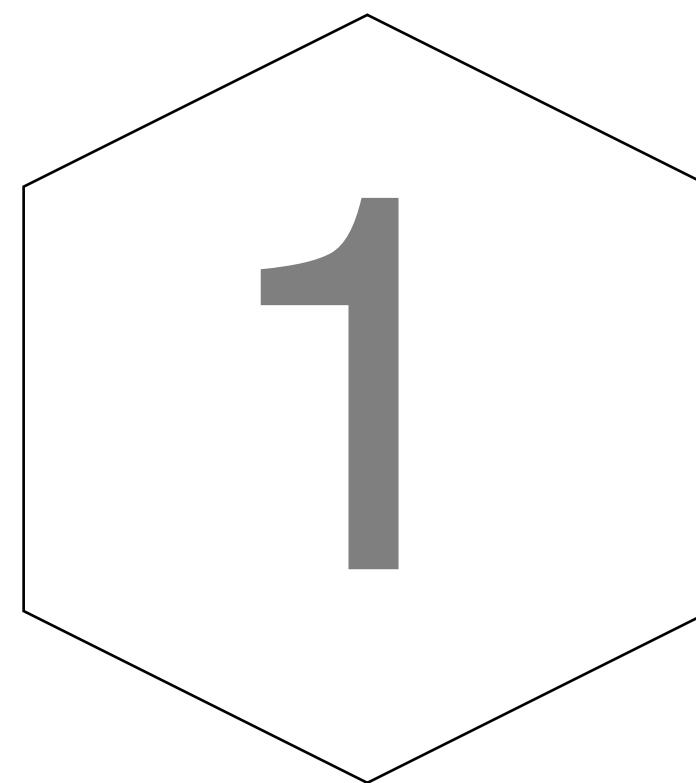
We process what we see, link the new information with old information, make judgements, filter out what is important and what not, and most importantly, we take decisions.

## OUTPUT

Based on the results of our thinking, we then interact with the others, communicating our decisions, telling our stories, building, creating and planning ahead.

# COMPUTER THINKING

Computers are designed by us. Therefore they think like us. Without exception.



**DATA**

INPUT



**CODE**

PROCESSING



**TABLES &  
FIGURES**

OUTPUT

1  
INPUT

DATA

# DATA



# NUMBERS

# Logicals, Integers, Real Numbers

## TEXT

## Characters, Strings

W H E R E   C A N   I   G E T   D A T A   F R O M ?

# DATA SOURCES

## DATA.GOV.SG

Excellent source for real-time public data

M O R E

## FRED

US Federal Reserve Economic Data

M O R E

## REALIS

Transaction-level information on Singapore  
residential real estate market

M O R E

## WORLD BANK

Free and open access to global development data

M O R E

## FACTIVA

All the world's news in one place

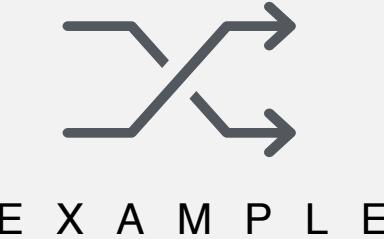
M O R E

# 2

PROCESSING

---

# CODE



# CONDITIONAL STATEMENT

## EXPLANATION

- Does this code make sense to you?
- It is a conditional statement (If-Then-Else).

Name = “John”

Age = 23

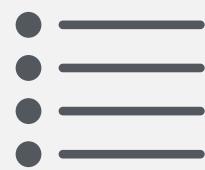
If Age < 35 Then

Status = “Young”

Else

Status = “Old”

End If



EXAMPLE

# REPEATED ITERATION

## EXPLANATION

- Does this code make sense to you?
- It is defining an iteration/loop. (For-Next).

```
Names = {"John", "Brian", "Alexandra"}  
Ages = {23, 31, 39}
```

```
For i = 1 to 3  
  If Age(i) < 35 Then  
    Status(i) = "Young"  
  Else  
    Status(i) = "Old"  
  End If  
Next
```



C O D E

# FUNCTION

Function Status(Age)

If Age < 35 Then

Status = “Young”

Else

Status = “Old”

End If

End Function

Status(23) = ?

## EXPLANATION

- Does this code make sense to you?
- It is defining a sub-routine (Function).

# THE BUILDING BLOCKS

WITH JUST THESE 3 INGREDIENTS (BUILDING BLOCKS) YOU CAN  
WRITE CODE TO SOLVE ANY PROBLEM



## CONDITIONAL STATEMENTS (IF-THEN-ELSE)

Most of our thoughts are decisions! Similarly, most of the operations that we ask the computer to do for us are conditional statements.



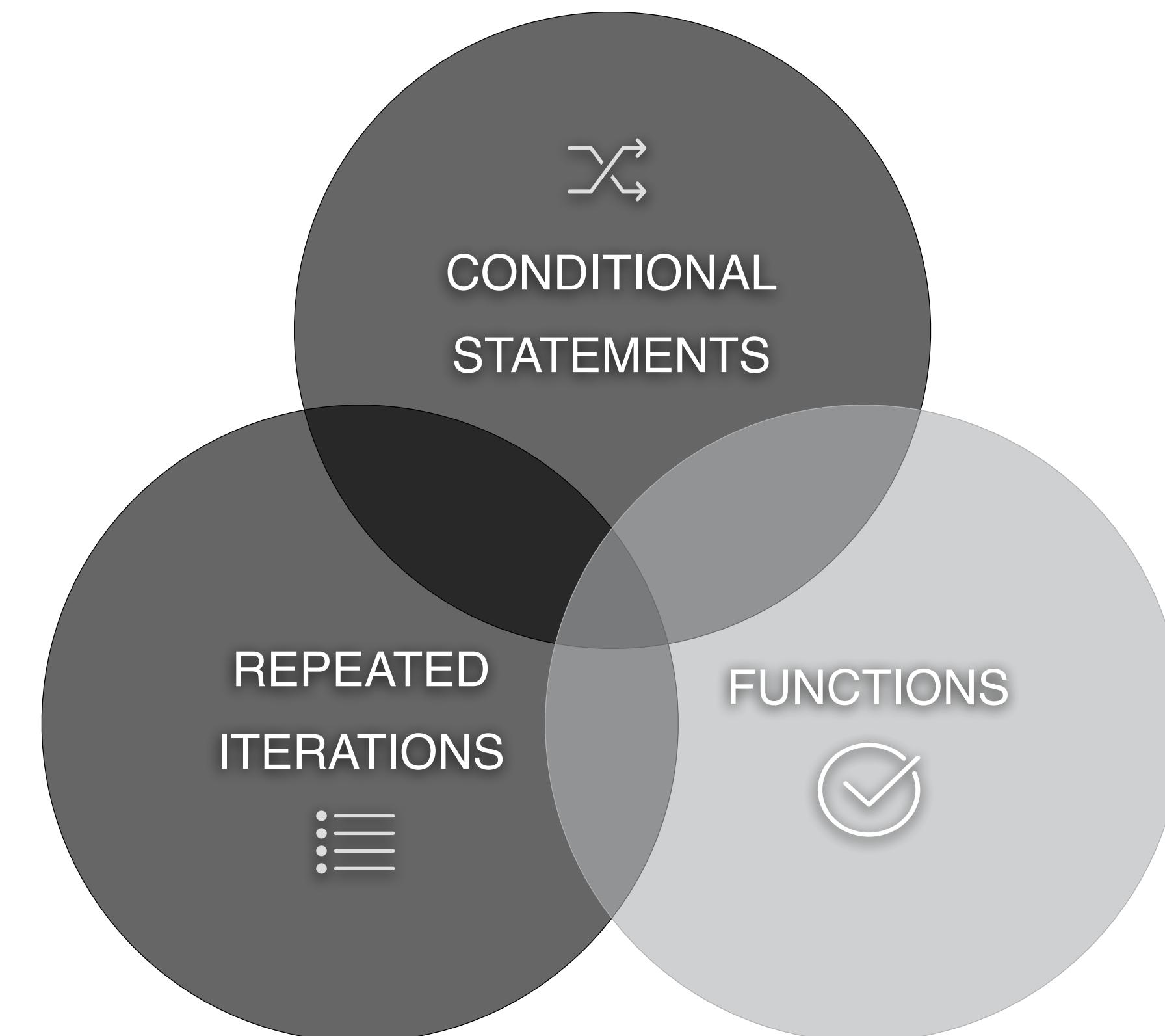
## REPEATED ITERATIONS (FOR)

The primary reason to use a computer at all is because it can perform repetitive tasks.



## FUNCTIONS

The reason why we write functions is to be able to apply the same operations to many different objects.



# 3

OUTPUT

## TABLES & FIGURES

W H A T A R E W E A I M I N G F O R ?

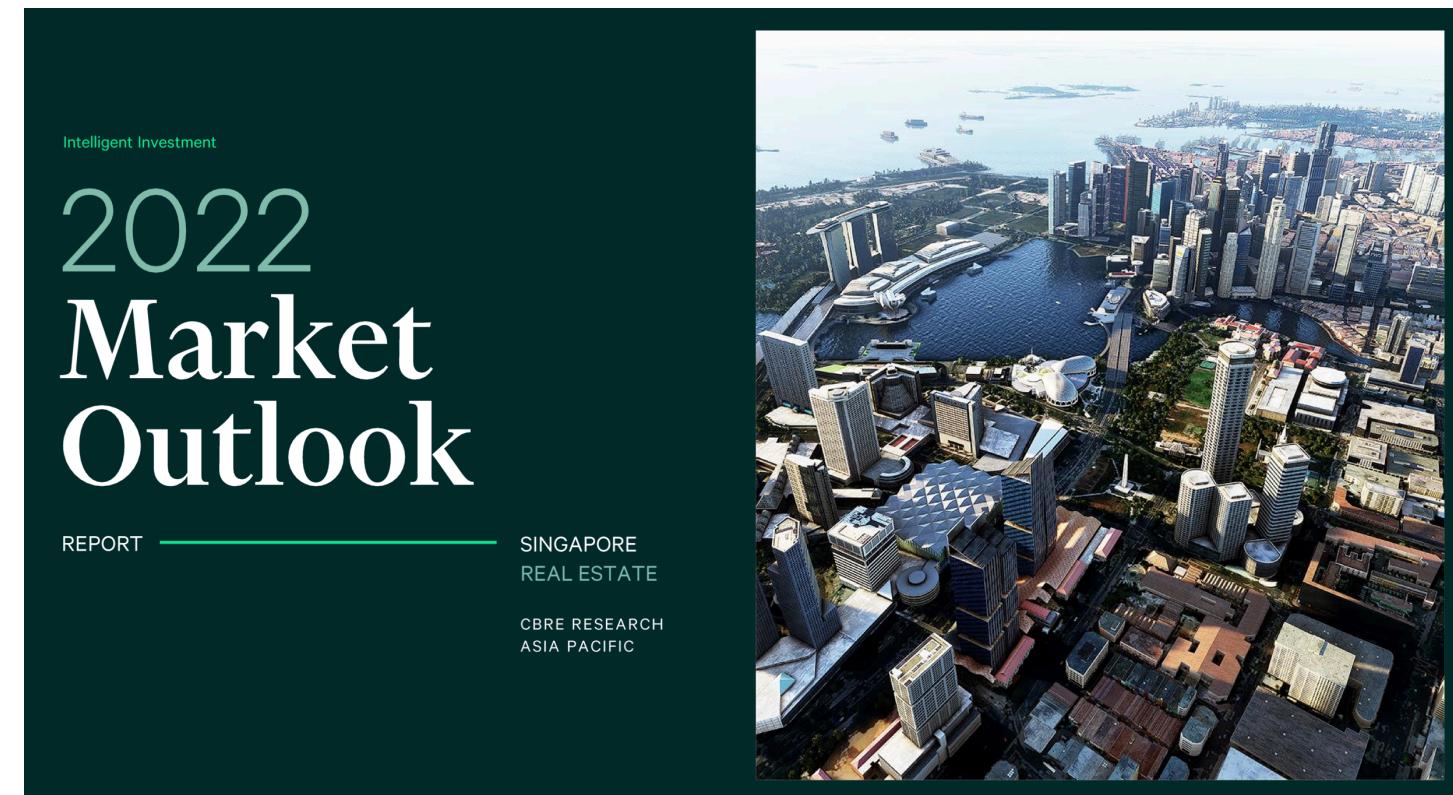
# BUSINESS-LEVEL QUALITY

## 2022 Singapore Market Outlook Seizing Opportunities, Overcoming Challenges

|  | Opportunities  | Challenges  | 2022 Forecast (y-o-y)   |
|--|--|---|---|
|  <b>Office</b>      | <b>Climbing up the rental cycle</b><br>CBD Grade A office space to outperform on return to office, ample demand, limited new supply, and flight to quality trends. | <b>Hybrid working and productivity</b><br>Companies to evaluate systems, policies and office designs to effectively manage hybrid working and attract/ retain talent. | <b>Rents:</b> + 6% – 7% (Grade A Core CBD)<br><b>Yields:</b> Stable               |
|  <b>Logistics</b>   | <b>Upbeat rental outlook</b><br>Tight supply pipeline and strong demand should ensure continued rental growth in 2022.   | <b>Availability of prime spaces</b><br>Limited prime spaces could deflect occupiers to less ideal second-tier spaces.   | <b>Rents:</b> + 5% (Prime Logistics)<br><b>Yields:</b> Stable                     |
|  <b>Retail</b>      | <b>Glass half full</b><br>A year of two halves – with delayed border reopening in the first half and firmer recovery in the second half.                           | <b>Shift in shopping patterns</b><br>Pandemic-related restrictions and closed borders have accelerated e-commerce and fickle shopping behaviour.                      | <b>Rents:</b> + 1% – 2% (Islandwide Prime)<br><b>Yields:</b> Stable               |
|  <b>Residential</b> | <b>Pent-up demand</b><br>Prospects still positive on strong underlying fundamentals and limited unsold inventory, despite cooling measures in end-2021.            | <b>Hurdles for investors and foreigners</b><br>Increase of 10 percentage points in ABSDs could deter investors, foreigners and developers in the short term.          | <b>Prices:</b> + 1% – 3%<br><b>Volumes:</b> 9,000 – 10,000 units (New Home Sales) |
|  <b>Investment</b>  | <b>Top investment destination</b><br>Singapore emerges top 3 in APAC for investors as a safe haven and a key gateway city for core assets.                         | <b>Maintaining investment returns</b><br>Investors to adapt to tight yields and interest rate uncertainty by adopting higher risk strategies.                         | <b>Volumes:</b> + 10%   |

CBRE

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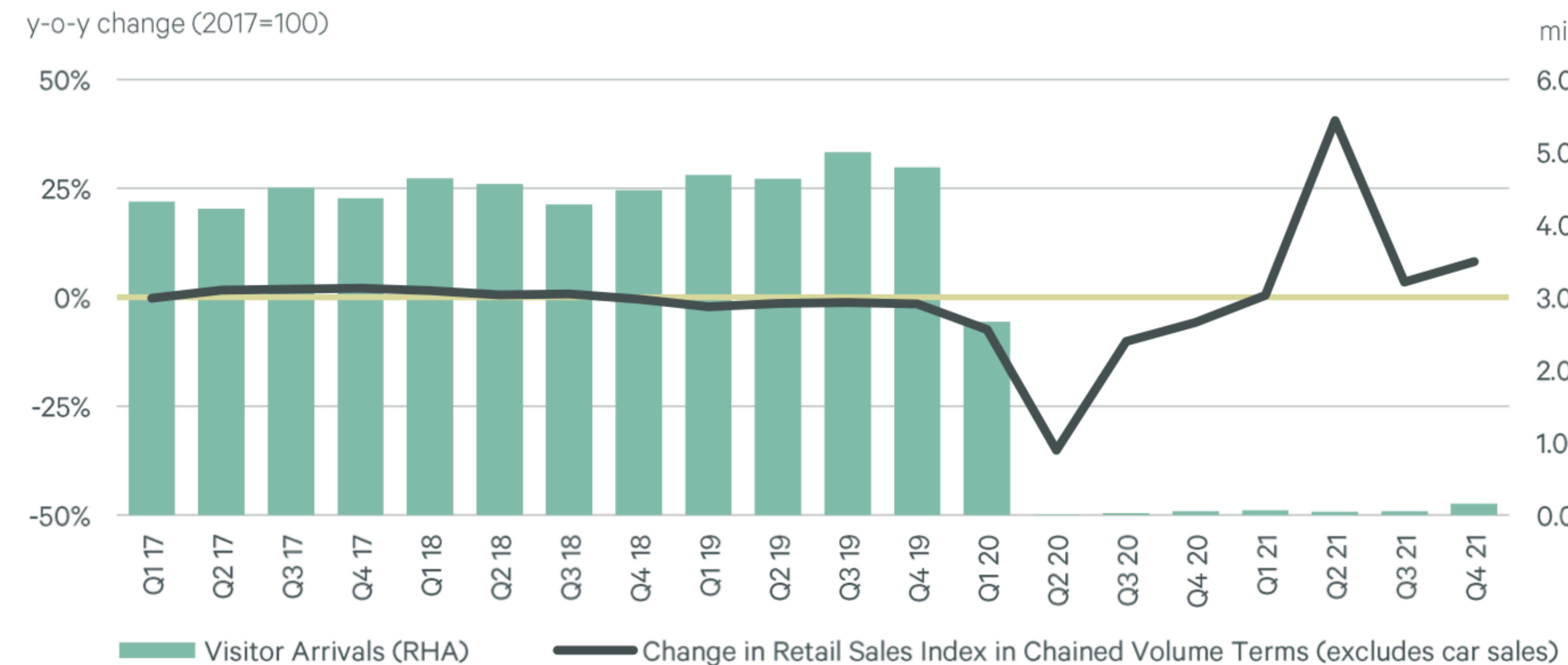


Download Full CBRE Report

 CANVAS

# IS THIS A GOOD FIGURE?

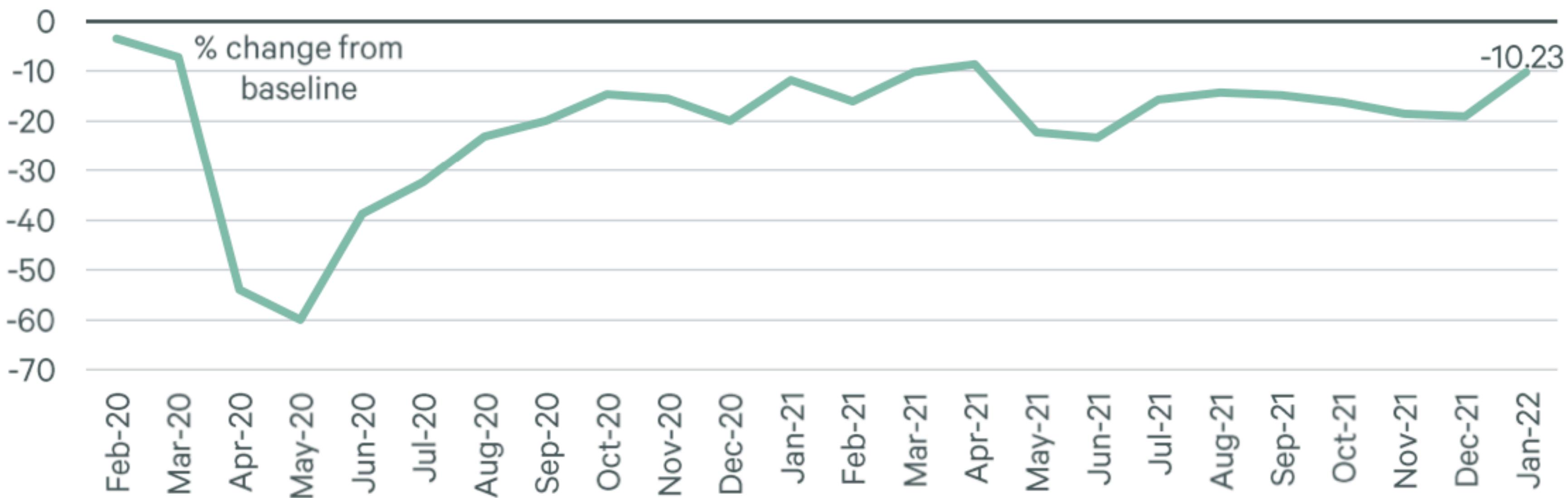
FIGURE 4: Retail Economic Indicators



Source: STB, MTI, CBRE Research, Q1 2022

# IS THIS A GOOD FIGURE?

Figure 8: Google Mobility Index (Singapore) – Visits to workspace

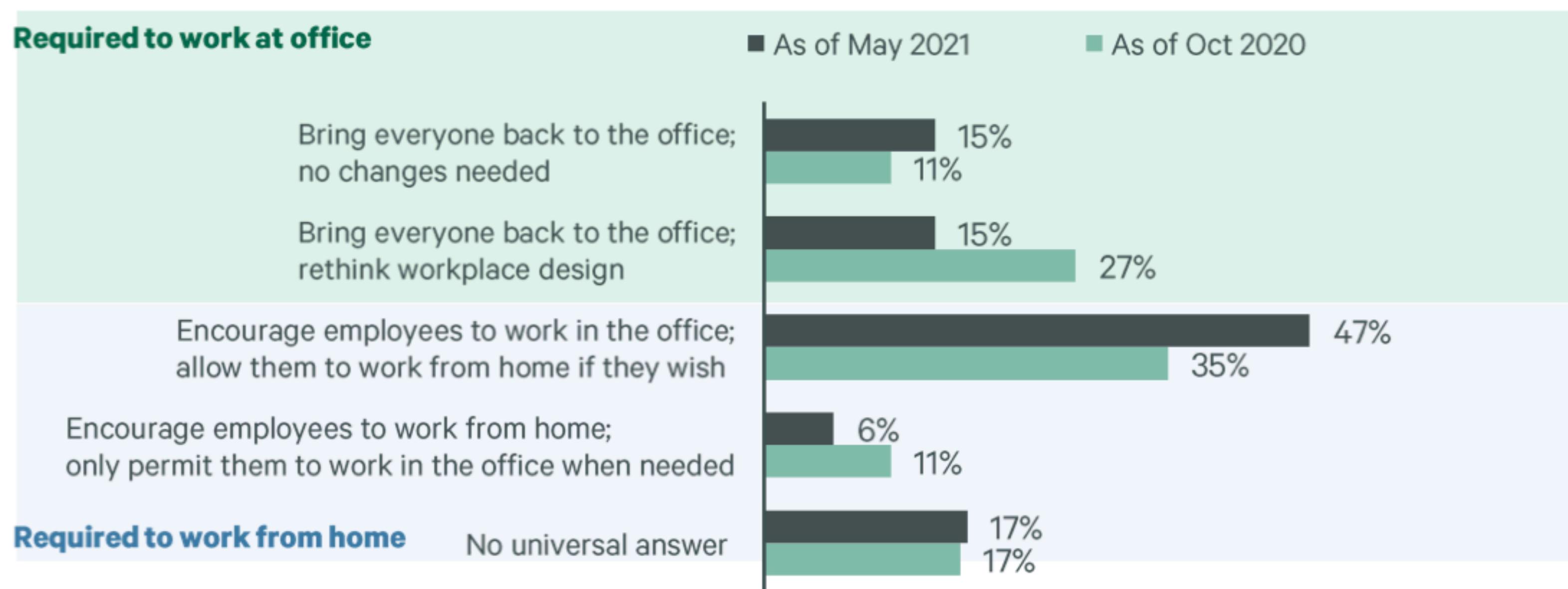


Source: CBRE Research, Google, Jan 2022 up to 22 Jan.

Note: Google's mobility index extracted from Google's COVID-19 Community Mobility Reports, as of monthly average.  
The baseline is the median value for the corresponding day of the week during the 5-week period 3 Jan – 6 Feb 2020.

# IS THIS A GOOD FIGURE?

Figure 9: Leadership sentiment towards future of work, when pandemic is contained



Source: Asia Pacific Office Occupier Survey, CBRE Research, Jun 2021

N= 109 respondents

# HOW ABOUT THIS TABLE?

Figure 24: Revised ABSD rates

| <b>Additional Buyer's Stamp Duty (ABSD)</b> |  | <b>Rates from<br/>6 Jul 18 – 15 Dec 21</b> | <b>Rates on &amp; after<br/>16 Dec 21</b> |
|---|--|--|---|
| Singapore Citizens                          | <sup>2<sup>nd</sup></sup><br>Residential<br>property | 12%  | 17% (Revised)                             |
|   | <sup>3<sup>rd</sup> &amp;<br/>subsequent</sup>       | 15%  | 25% (Revised)                             |
| Permanent Residents                         | <sup>2<sup>nd</sup></sup>                            | 15%  | 25% (Revised)                             |
|   | <sup>3<sup>rd</sup> &amp;<br/>subsequent</sup>       | 15%  | 30% (Revised)                             |
| Foreigners                                  | Any  | 20%  | 30% (Revised)                             |
| Entities                                    | Any  | 25%*                                       | 35%* (Revised)                            |

Source: MND, MAS

Note: \*Plus additional 5% for Housing Developers (non-remittable)

# COMPUTER THINKING

Can you now think like a computer?



1

**DATA**

INPUT



2

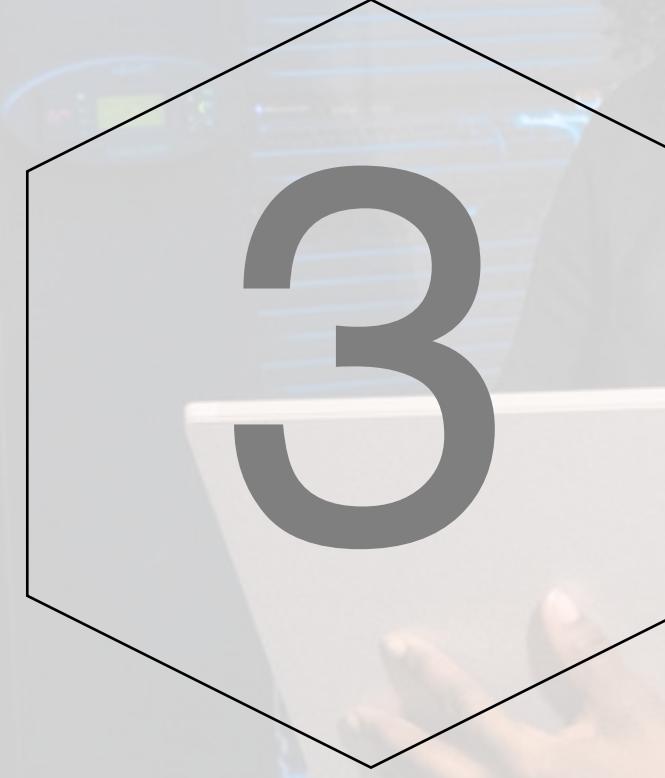
**CODE**

PROCESSING

☒ Conditional statements

☰ Repeated iterations

✓ Functions



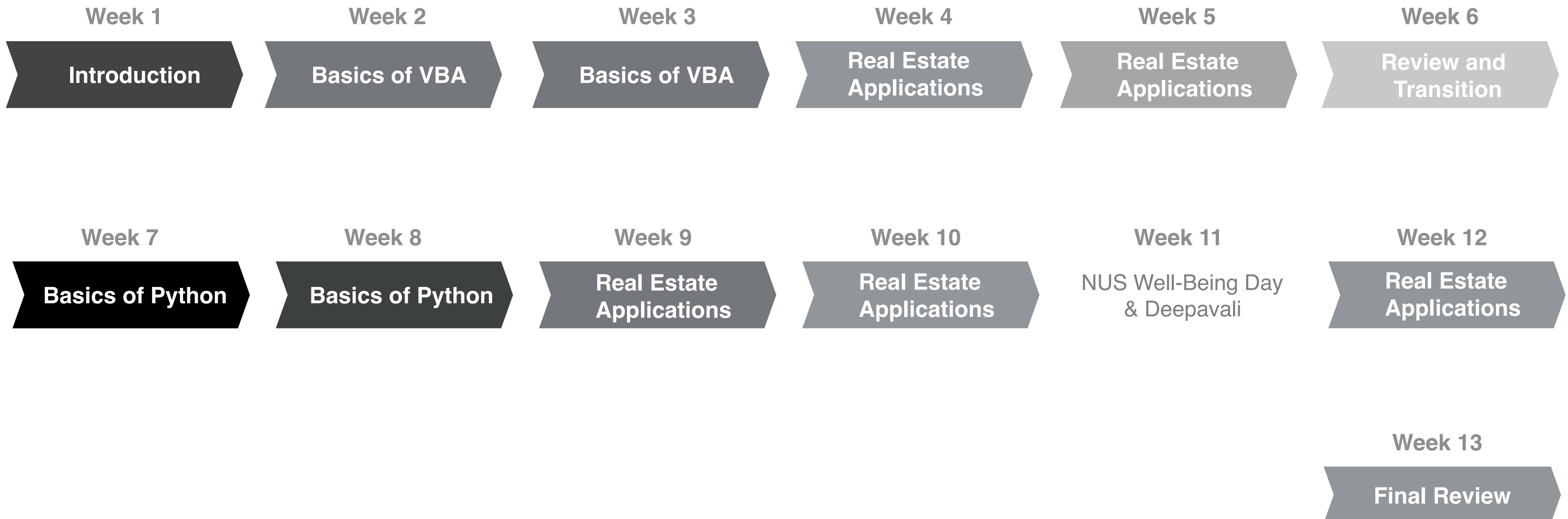
3

**TABLES & FIGURES**

OUTPUT

# ADMIN ISSUES

# THIS MODULE

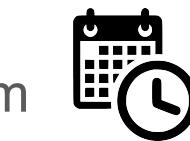


# FINAL GRADE FOR THE MODULE

3 x e-Quiz ..... 30%

Weeks 4, 9 and 12:

During Lecture time on *Monday* at 3pm



Individual Project ..... 30%



Excel

Instructions issued: Week 5

Deadline for submission: Friday, 16 September 2022



Group Project ..... 40%



python™

Instructions issued: Week 10

Deadline for submission: Friday, 11 November 2022



S E E   Y O U   N E X T   W E E K !

# POST-LECTURE DE-BRIEF

## ⟩ GETTING TO KNOW YOU

Over the course of the module, we will use Google Slides to check attendance, make sure progress is achieved, and to provide two-way feedback. Here is the link for today:

<https://tinyurl.com/RE2708Lecture1Group1>

...

<https://tinyurl.com/RE2708Lecture1Group5>

## ⟩ DATA.GOV.SG

This is one of the most fascinating websites in the Singapore online ecosystem. It contains all data that you may possibly need, from HDB resale prices to the locations of hospitals and fire stations, and the real-time availability of taxis in a particular location.