AP CALCULUS BC • EXERCISE SHEET

2.7 Derivatives of cos x, sin x, e^x, and ln x

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **the derivatives of** $\cos x$, $\sin x$, e^x, **and** $\ln x$.

You must be able to:

- state and use these four standard **derivatives** 导数

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ **Key derivatives**

$$\frac{d}{dx}[\sin x] = \cos x, \quad \frac{d}{dx}[\cos x] = -\sin x,$$

$$\frac{d}{dx}[e^x] = e^x, \quad \frac{d}{dx}[\ln x] = \frac{1}{x}.$$

2 Practice

2.1 State $\frac{d}{dx}[\sin x]$. [1]

2.2 State $\frac{d}{dx}[e^x]$. [1]

2.3 State $\frac{d}{dx}[\cos x]$ and $\frac{d}{dx}[\ln x]$. [2]

3 Exam-style questions

3.1 $\dfrac{d}{dx}[\cos x]$ equals [1]

- **A** $\sin x$
- **B** $-\sin x$
- **C** $\cos x$
- **D** $-\cos x$

3.2 $\dfrac{d}{dx}[\ln x]$ equals [1]

- **A** x
- **B** $\dfrac{1}{x}$
- **C** $\ln x$
- **D** e^x

3.3 Differentiate each.

(a) $\sin x$. [1]

(b) e^x. [1]

(c) $\cos x$. [1]

4 Go further

- work through the **2.7 Derivatives of cos x, sin x, e^x, and ln x** lesson on the **Learn** page;
- read the **Differentiation: Definition and Fundamental Properties** section of the AP Calculus BC handout on the **Know** page.

Solutions

2.1 $\cos x$.

2.2 e^x.

2.3 $\dfrac{d}{dx}[\cos x] = -\sin x$; $\dfrac{d}{dx}[\ln x] = \dfrac{1}{x}$.

3.1 **B**.

3.2 **B**.

3.3 (a) $\cos x$. (b) e^x. (c) $-\sin x$.