

3.11 The Secant, Cosecant, and Cotangent Functions

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

KEY WORDS reciprocal functions 倒数函数

Objective

Build the skills to answer exam questions on **the secant, cosecant, and cotangent functions**.

You must be able to:

- write sec, csc, and cot as **reciprocal functions** 倒数函数 of cos, sin, and tan

1 Worked examples

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

■ Reciprocal functions

$$\sec x = \frac{1}{\cos x}, \quad \csc x = \frac{1}{\sin x}, \quad \cot x = \frac{\cos x}{\sin x} = \frac{1}{\tan x}.$$

Each is undefined where its denominator is 0.

■ Example

$$\sec 0 = \frac{1}{\cos 0} = 1; \quad \csc \frac{\pi}{2} = \frac{1}{\sin(\pi/2)} = 1.$$

2 Practice

2.1 State $\sec x$ in terms of $\cos x$. [1]

2.2 State $\csc x$ in terms of $\sin x$. [1]

2.3 Evaluate $\sec 0$ and $\csc \frac{\pi}{2}$. [2]

3 Exam-style questions

3.1 $\sec x$ equals [1]

- | | |
|---|---|
| A | B |
| C | D |
- A $1/\sin x$
B $1/\cos x$
C $1/\tan x$
D $\cos x$

3.2 $\cot x$ equals [1]

- | | |
|---|---|
| A | B |
| C | D |
- A $\sin x/\cos x$
B $\cos x/\sin x$
C $1/\sin x$
D $\tan x$

3.3 Answer each.

- (a) Evaluate $\sec 0$. [1]
(b) Evaluate $\csc \frac{\pi}{2}$. [1]
(c) State where $\csc x$ is undefined. [1]