DERIVATIVES OF TRIGONOMETRIC FUNCTIONS

1 Differentiate with respect to x:

(a) $\sin 3x$ **(b)** $3\sin x$ **(c)** $\cos 2x$ **(d)** $2\cos x$

(e) $\sin x + 4\cos x$ **(f)** $\tan 2x$ **(g)** $\sin 2x - \cos 2x$ **(h)** $\sin\left(x + \frac{\pi}{4}\right)$

2 The derivative of $\cos^2 5t$ is:

A $-10\sin 5t\cos 5t$ **B** $-10\cos 5t$ **C** $-5\sin 5t\cos 5t$ **D** $-2\sin 5t\cos 5t$

3 Differentiate with respect to x:

(a) $\sin x\cos x$ **(b)** $x\sin x$ **(c)** $2x\tan x$ **(d)** $x^2\cos x$

(i) $x\sec x$ (j) $\dfrac{\operatorname{cosec} x}{x}$ (k) $x^2\cot x$ (l) $\dfrac{\sec x}{\operatorname{cosec} x}$

5 Differentiate with respect to x:

(a) $\cos^2 2x$ **(b)** $\sin^2 3x$ **(c)** $\cos^3 x$ **(d)** $\cos(x^3)$

6 Find $f'(x)$ for $f(x) = 3\sin\frac{x}{2} - 4\cos\frac{3x}{2} - x^3$. Indicate whether each statement below is a correct or incorrect step in finding $f'(x)$.

(a) $\frac{d}{dx}\left(3\sin\frac{x}{2}\right) = \frac{3}{2}\cos\frac{x}{2}$

(b) $\frac{d}{dx}\left(4\cos\frac{3x}{2}\right) = 6\sin\frac{3x}{2}$

(c) $f'(x) = \frac{3}{2}\cos\frac{3x}{2} - 6\sin\frac{3x}{2} - 3x^2$

(d) $f'(x) = \frac{3}{2}\cos\frac{x}{2} + 6\sin\frac{3x}{2} - 3x^2$

7 Differentiate with respect to x:

(a) $\sqrt{\sin 2x}$

(b) $(\sin x - \cos x)^2$

(c) $\sin^2 x + \cos^2 x$

8 Differentiate with respect to x:

(a) $e^x \sin x$ **(b)** $e^{2x} \cos \frac{x}{2}$ **(c)** $e^{-x} \sin 3x$ **(d)** $e^x \cos 4x$

(e) $(\cos x + \sin x)e^{-x}$ (f) $e^{\sin 2x}$ (g) $e^{\cos x}$ (h) $e^{\sin x + \cos x}$