Differentiation : 3

1) Differentiate

a) $\ln(4x^2 - 3x - 5)$

b) $e^{\sqrt{x}}$

c) $\dfrac{a + b\sin x}{a - b\sin x}$ where a, b are constants

2) Writing $\cot x = (\tan x)^{-1}$ and assuming the derivative of $\tan x$, find $\dfrac{d}{dx}(\cot x)$, simplify your answer.

3) Differentiate

a) $(7 - 9x^2)^5$ b) $\tan^{-1} 6x$

c) $e^{4x} \tan 2x$ d) $\dfrac{3 + \sin x}{2 + \cos x}$

4) Differentiate

a) $\sqrt{3x^2 + 5x}$ b) $\sin^{-1} 3x$

5) By first writing $y = \cot^{-1} x$ as $x = \cot y$ and then assuming the derivative of $\cot y$, find $\dfrac{dy}{dx}$ in terms of x.

6) Differentiate

a) $\sqrt{5x^2 - 3x}$ b) $\sin^{-1} 7x$ c) $e^{3x} \ln x$

7) By first writing $\cot x = \dfrac{\cos x}{\sin x}$ show $\dfrac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$

8) Differentiate

a) $\tan^{-1} 4x$ b) e^{x^3} c) $x^5 \ln x$ d) $\dfrac{3 - 2x^2}{5 - 4x^2}$

9) Differentiate

a) $\sqrt{2 + 5x^3}$ b) $x^2 \sin 3x$ c) $\dfrac{e^{2x}}{x^4}$

10) By first writing $y = \tan^{-1} x$ as $x = \tan y$ find $\dfrac{dy}{dx}$ in terms of x.