

1. Differentiate

(a) $\arcsin(x^2)$

Use the chain rule. x^2 is the inner function, while $\arcsin x$ is the outer function.

$$\frac{d(\arcsin(x^2))}{dx} = \frac{1}{\sqrt{1 - (x^2)^2}} \frac{d(x^2)}{dx} = \frac{2x}{\sqrt{1 - x^4}}$$

(b) $\arctan(3x - 7)$

Again use the chain rule.

$$\begin{aligned} \frac{d \arctan(3x - 7)}{dx} &= \frac{1}{1 + (3x - 7)^2} \frac{d(3x - 7)}{dx} \\ &= \frac{3}{9x^2 - 42x + 50} \end{aligned}$$

2. Solve the following indefinite integrals

(a) $\int \frac{1}{1 + 9x^2} dx = \int \frac{1}{1 + (3x)^2} dx = \frac{1}{3} \arctan(3x)$

(b) $\int \frac{4x}{\sqrt{1 - 4x^4}} dx = \int \frac{1}{\sqrt{1 - (2x^2)^2}} \frac{d(2x^2)}{dx} dx = \arcsin 2x^2$