



Differentiation of Inverse Trigonometric And Hyperbolic Functions Exam Questions (Edexcel)

Q1.

(a) Given that $y = x \arcsin x$, $0 \leq x \leq 1$, find

(i) an expression for $\frac{dy}{dx}$,

(ii) the exact value of $\frac{dy}{dx}$ when $x = \frac{1}{2}$.

(3)

(b) Given that $y = \arctan(3e^{2x})$, show that

$$\frac{dy}{dx} = \frac{3}{5 \cosh 2x + 4 \sinh 2x}$$

(5)

(Total 8 marks)

(Q13 6669/01, June 2011)

Q2.

The curve C has equation

$$y = \arccos\left(\frac{1}{2}x\right) \quad -2 \leq x \leq 2$$

(a) Show that C has no stationary points.

(3)

The normal to C , at the point where $x = 1$, crosses the x -axis at the point A and crosses the y -axis at the point B .

Given that O is the origin,

(b) show that the area of the triangle OAB is $\frac{1}{54}(p\sqrt{3} + q\pi + r\sqrt{3}\pi^2)$ where p , q and r are integers to be determined.

(5)

(Total for question = 8 marks)

(Q05 9FM0/02, Oct 2021)



Q3.

(a) Given that

$$y = \arcsin x \quad -1 \leq x \leq 1$$

show that

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

(3)

(b) $f(x) = \arcsin(e^x)$ $x \leq 0$

Prove that $f(x)$ has no stationary points.

(3)

(Total for question = 6 marks)

(Q05 9FM0/02, June 2022)

Q4.

The curve C has equation

$$y = \operatorname{arsinh}(x^3), \quad x \geq 0.$$

The point P on C has x -coordinate $\sqrt{2}$.

(a) Show that an equation of the tangent to C at P is

$$y = 2x - 2\sqrt{2} + \ln(3 + 2\sqrt{2}).$$

(5)

The tangent to C at the point Q is parallel to the tangent to C at P .

(b) Find the x -coordinate of Q , giving your answer to 2 decimal places.

(5)

(Total 10 marks)

(Q11 6675/01, June 2008)

Q5.

Given that $y = \operatorname{arsinh}(\tanh x)$, show that

$$\frac{dy}{dx} = \frac{\operatorname{sech}^2 x}{\sqrt{1 + \tanh^2 x}}$$

(5)

(Total for question = 5 marks)

(Q15 6669/01, June 2017)