

Math 100 Sample Test 3 – November 2018

Question 1

Differentiate

$$f(x) = \frac{\ln x}{1 - e^{-x}}$$

$$f(x) = \arccos(x^2)$$

$$f(t) = \log_2(1 - \pi t)$$

$$f(x) = \arctan(1/x) - \operatorname{arccot}(2x)$$

Question 2 : Let $\theta = \arccos(-0.25)$. Compute $\sin(\theta)$.

Let

$$f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}.$$

Find its inverse and state the domain and range of the inverse.

Question 3

$f(x) = \arctan(\arcsin x)$. Compute $f'(0)$.

Question 4: A cubical box is to be built so that it holds 125 m^3 . How precisely should the edge be made so that the volume will be correct within 3 cm^3 ?

Question 5

A boat passes a fixed buoy at 9 a.m. heading due west at 3 miles per hour. Another boat passes the same buoy at 10 a.m. heading due north at 5 miles per hour. How fast is the distance between the boats changing at 11:30 a.m.? Hint: use $\sqrt{2} \approx 1.4$.

Question 6 :

On the curve

$$x^3 - xy + y^3 = 0$$

find all points where the tangent line is vertical.