

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

---

ASSIGNMENT 7

MATHEMATICS 1000

FALL 2022

---

**Due: Wednesday, November 23rd, 2022 at 11:59pm.** Show all work. See the Grade-scope Handout for submission information.

**Note:** You should complete the WebAssign problem sets “Inverse Trigonometric Functions”, “Derivatives of Hyperbolic Functions” and “Higher Derivatives”, as well as Workshhets 3.5, 3.6, 3.7 and 4.1, before you work on this assignment.

1. Find the equation of the line that is tangent to the curve

$$f(x) = \arcsin(\sqrt{x})$$

at the point  $x = \frac{1}{2}$ .

2. Find  $\frac{d^2y}{dx^2}$  for each of the following.

(a)  $y = \sinh(\arctan(x))$

(b)  $\sqrt{x} - \sqrt{y} = 4$

3. A baseball diamond is a square with sidelength 90 feet. Toronto Blue Jays all-star Vladimir Guerrero Jr stands at first base when his teammate, Bo Bichette, hits the ball into the outfield. Guerrero runs from first base towards second base at 27 feet per second. To one decimal place, determine the rate at which Guerrero’s distance from third base is decreasing when he is halfway to second base.
4. A spotlight on the ground shines on a wall 10 metres away. A child who is 1 metre tall walks from the spotlight towards the wall, casting a shadow on the wall. If the height of the child’s shadow shrinks at a rate of 12.5 centimetres per second, how quickly is the child walking at the moment when she is 6 metres from the wall?