UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Department of Mathematics & Statistics

Winter 2024, Math 100, HW Assignment 5

Due: March 8, 2024, in class.

The numbers between brackets in the margin represent the marks assigned to the question. The maximum grade is 50.

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1. Consider the function $f(x) = \ln\left(\dfrac{2x+3}{3x+2}\right)$.

(10) (a) Find the domain and the range of f (in the interval form).

(10) (b) Determine the horizontal asymptote(s) and the vertical asymptote(s) of the function. Give the reasons that make the lines you list asymptotic.

(10) (c) Find $f'(x)$.

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(5) 2. Find x so that $7^{(x^2+1)} - 49 = 0$.

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(20) 3. If $(2x+3)e^{\frac{y}{x}} = x$, find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$.

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4. Solve (find x) the following equations if possible. If there is no solution to the given equation, state that together with an explanation.

(10) (a) $3(\log x)^2 + 2\log x - 5 = 0$.

(10) (b) $e^{2x} + 6e^x + 5 = 0$.

(10) (c) $e^{2x} - 6e^x + 5 = 0$.

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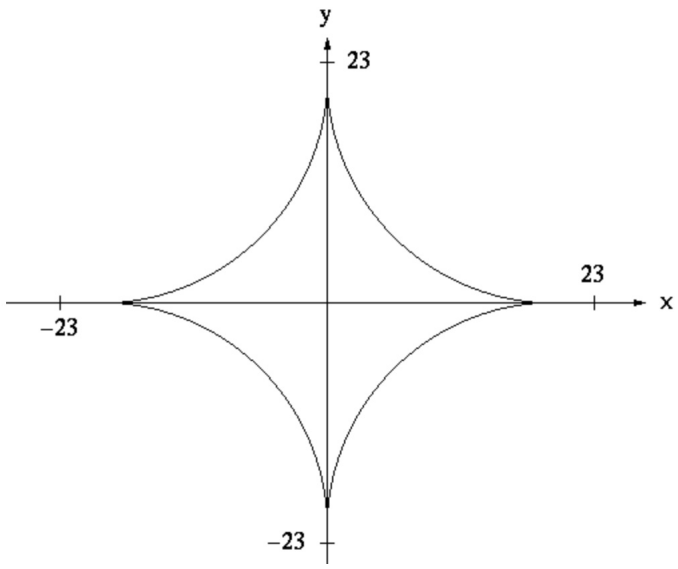
(15) 5. Find all points (x, y) on the graph of $x^{2/3} + y^{2/3} = 8$ (see diagram) where lines tangent to



the graph at (x, y) have a slope equal to -1.

TOTAL MARKS: 100