Name: _____

Directions: Show all work. No credit for answers without work.

1. [**3 parts, 1 point each**] Simplify the following expressions if possible.

   (a) $\dfrac{(x^2 \cdot x^3)^5}{x^6 + x^7}$ (b) $\sqrt{x^2 + y^2}$ (c) $\dfrac{2x + 15}{x + 5}$

2. [**2 parts, 1 point each**] Find the derivatives of the following functions.

   (a) $f(x) = \ln(e^x + \ln(x))$

   (b) $g(x) = x^{\sin(x)}$

3. [**2 points**] The function f takes an array of integers as input. Let $B = [2, 5, 3, 6]$; here array indexing starts with 1, so that $B[1] = 2$ and $B[4] = 1$. What does f return when called with input B? Explain your solution for partial credit.

<div style="text-align:center">

<u>$f(A[1..n])$:</u>
$s \leftarrow 0$
for $i = 1$ to n:
if i is even:
$s \leftarrow s + i \cdot A[i]$
else:
$s \leftarrow s - i \cdot A[i]$
return s

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4. [**3 points**] Given an array $A[1..n]$ of distinct integers in **sorted order** and an integer x, the function $\texttt{find}(A[1..n], x)$ should return $\texttt{True}$ if x is one of the values in A and $\texttt{False}$ otherwise. Give a pseudocode implementation of $\texttt{find}(A[1..n], x)$. A correct implementation is worth 2 points; a correct, *efficient* implementation is worth 3 points.