Homework 5.2 – Derivative and Antiderivative of e^x

1. **(1 pt) alfredLibrary/AUCI/chapter5/lesson2/question30pet.pg**
If $h(x) = e^{4x}\left(4+2x^5+10x^8\right)$, then $h(x) = f(x)g(x)$, where

$f(x) =$ _____ and $g(x) =$ _____.

By the product rule,

$h'(x) =$_____ *_____+ _____*_____

2. **(1 pt) alfredLibrary/AUCI/chapter5/lesson2/quiz/application2pet.pg**
The vertical position from equilibrium (in meters) of a hydraulic piston t seconds after a downward force is applied and released is given by the function $D(t) = -2te^{-5t}$.

(a) Find the time at which the piston is at its furthest from equilibrium. That is, find the time at which D has a maximum or minimum.

$t =$ _____ seconds

(b) Find the position at that time you found in part (a).

$D =$ _____ meters

3. **(1 pt) alfredLibrary/AUCI/chapter5/lesson2/criticalinflectionpoint1pet.pg**
Let $f(x) = \frac{4e^x}{4+e^x}$. If necessary, enter INF for ∞, -INF for $-\infty$, or NONE.

(a) $f'(x) =$ _____.

(b) The open interval of increase for $f(x)$ is _____.

(c) The open interval of decrease for $f(x)$ is _____.

(d) $f(x)$ has a local minimum at _____.

(e) $f(x)$ has a local maximum at _____.

(f) $f(x)$ has horizontal asymptotes at $y =$ _____.
(HINT: Set up the limits at ∞ and $-\infty$. Notice that one limit can be evaluated directly, and the other is well-suited for L'Hopital's rule.)

4. **(1 pt) alfredLibrary/AUCI/chapter5/lesson2/limit1pet.pg**

Determine if the function $y = \frac{8}{e^x-1}$ has any horizontal asymptotes by evaluating the following limits. If necessary, enter 'INF' for ∞ and '-INF' for $-\infty$. (HINT: Note that l'Hopital's rule does not apply to either limit. You must first determine the limit of the exponential term in the denominator.)

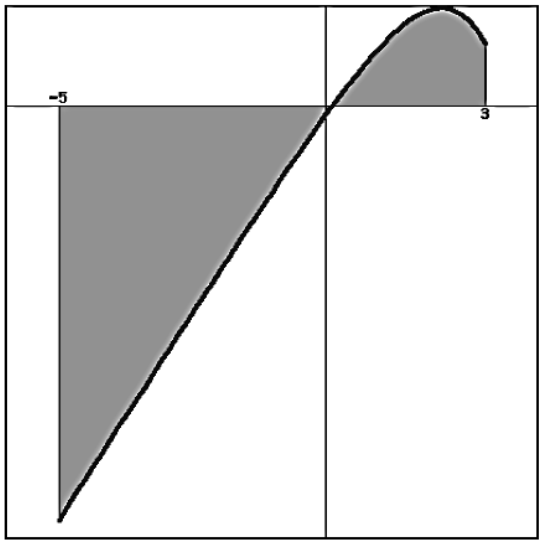
(a) $\lim_{x\to\infty} \frac{8}{e^x-1} =$ _____

Enter the right-hand asymptote, or enter NONE: $y =$_____

(b) $\lim_{x\to-\infty} \frac{8}{e^x-1} =$ _____

Enter the left-hand asymptote, or enter NONE: $y =$_____

5. **(1 pt) alfredLibrary/AUCI/chapter5/lesson2/integral2pet.pg**



(Click on graph to enlarge)

The graph of the function $f(x) = 9x - e^x$ is the thick blue curve shown above. Assuming that the Fundamental Theorem of Calculus holds for exponential functions, use it to find the shaded area.

___$\int$___ ____ dx = ____ $\Big|$ _____ = _____