5. [12 points] Consider the following expressions:

$$9e^{-2x} \qquad\qquad 4x + 9 \qquad\qquad 9\tan\left(\frac{\pi}{2}x\right) \qquad\qquad \frac{18}{1 + e^{-x}}$$

$$3x^2 + 9 \qquad\qquad 9 + \sin\left(\frac{x}{30}\right) \qquad\qquad 9\tan(3\pi x) \qquad\qquad \ln(2x - 1)$$

In each of the following parts, write down *in the space provided* **all** of the expressions above which *could* be formulas for the function described. If more than one expression applies, write them all on the same line and ensure that they are clearly separated. If none of the expressions apply, write NONE OF THE ABOVE.

a. [3 points] The function $f(x)$ satisfies $f(x) \geq 9$ for $x \geq 0$.

$f(x)$ *could be:* $\qquad 4x + 9, \qquad \dfrac{18}{1 + e^{-x}} \qquad \text{or} \quad 3x^2 + 9$

b. [3 points] The function $g(x)$ is periodic with period $\dfrac{1}{3}$.

$g(x)$ *could be:* $\qquad\qquad 9\tan(3\pi x)$

c. [3 points] The function $h(x)$ has a vertical asymptote at $x = \dfrac{1}{2}$.

$h(x)$ *could be:* $\qquad\qquad \ln(2x - 1) \quad \text{or} \quad 9\tan(3\pi x)$

d. [3 points] The function $i(x)$ has $\lim\limits_{x \to \infty} i(x) = C$ where $C \geq 0$ is a nonnegative constant.

$i(x)$ *could be:* $\qquad\qquad 9e^{-2x} \quad \text{or} \quad \dfrac{18}{1 + e^{-x}}$