3. [11 points] For positive constants a and b, the potential energy of a particle is given by

$$U(x) = a\left(\frac{5b^2}{x^2} - \frac{3b}{x}\right).$$

Assume that the domain of $U(x)$ is the interval $(0, \infty)$.

a. [2 points] Find the asymptotes of $U(x)$. If there are none of a particular type, write NONE.

Answer: Vertical asymptote(s): _____ Horizontal asymptote(s): _____

b. [6 points] Find the x-coordinates of all local maxima and minima of $U(x)$ in the domain $(0, \infty)$. If there are none of a particular type, write NONE. You must use calculus to find and justify your answers. Be sure to provide enough evidence to justify your answers fully.

Answer: Local max(es) at $x =$ _____ Local min(s) at $x =$ _____

c. [3 points] Suppose $U(x)$ has an inflection point at $(6, -14)$. Find the values of a and b. *Show your work, but you do not need to verify that this point is an inflection point.*

Answer: $a =$ _____ and $b =$ _____