Problems 3

Let x be large

Find the leading asymptotic term for the integral:

$$\int_a^b e^{-xp(t)} q(t)\,dt \cong ? \equiv I(x)$$

in the $2^{\text{different}}$ cases:

(1) $p(t)$ has its minimum at $t_{min} = a$,

$p'(a) > 0$, $q(a) \neq 0$.

$I_1(x) = ?$

(2) $p(t)$ has $^{\text{simple}}$ min at $a < t_{min} < b$

$p'(t_{min}) = 0$, $p''(t_{min}) > 0$,

$q(t_{min}) \neq 0$

$I_2(x) = ?$