Name

5.73

Quiz 8

1.

$$\boxed{\begin{aligned}&\int_{x_-(E)}^{x_+(E)} p_E(x')dx' = \frac{h}{2}(n+1/2)\\ &p_E(x) = \left[2m(E - V(x))\right]^{1/2}\end{aligned}}$$

Even though WKB cannot be valid for a potential of the form

$V=0$	$\lvert x\rvert \geq L/2$
$V=-V_0$	$\lvert x\rvert < L/2$

A. Evaluate the quantization integral at $E = 0$ and determine the number of bound levels, n_{max},.in the potential.

B. Calculate $\frac{dn_{\max}}{dL}$.

C. Calculate $\frac{dn_{\max}}{dV_0}$.

(*over*)

D. Which leads to a larger increase in $n_{\max}$, a 10% increase in L or a 10% increase in V_0?

E. Consider the "bifurcated potential":

$$V = 0 \qquad |x| > 20L$$
$$V = 0 \qquad |x| < 19.5L$$
$$V = -V_0 \qquad 19.5L \le |x| \le 20L$$

Without doing any new calculations but keeping the result of part A clearly in mind, compare the number of bound levels in the bifurcated potential to those in the original finite square well that is the subject of part A.