(no fermions). Then the renormalization group equations, Equation 2.23, as well as the general solution, Equation 2.27, are exact. One can use them to discuss the on-mass shell, or infrared behavior of the theory by letting: $\lambda \to o$, $t = \ell n \lambda \to -\infty$. The effective coupling constant $\bar{g}$, which controls the dynamics in this region is given (in terms of $\bar{g}(t=o, g)=g$) as usual by

$$\int_g^{\bar{g}(t)} \frac{dx}{\beta(x)} = t \qquad 5.1$$

The behavior of $\bar{g}$ as $t \to -\infty$ will depend on the actual form of $\beta(g)$. We can distinguish two cases:

A. $\beta(g)$ vanishes at $g=g_1<\infty$. In this case $\bar{g}(t)$ will approach g_1 as $t \to -\infty$, its rate of approach will depend on the nature of the zero. This is the simplest case to envisage, the Green's functions will scale according to Equation 2.29 with some anomalous dimension.

B. $\beta(g)$ is always negative. Here we must further specify whether the integral

$$T = \int_g^{\infty} \frac{dx}{\beta(x)} \qquad 5.2$$

is finite or not.

If $T=\infty$ then $\bar{g}(t)$ approaches infinite values as $t \to -\infty$. Indeed if $\beta(x) \approx x^{\alpha}$, $\alpha<1$, for large x then $\bar{g}(t) \sim (-t)^{\frac{1}{1-\alpha}}$ for large t.

If on the other hand T is finite then the effective coupling constant <u>diverges for finite momenta</u>. In fact $\bar{g}(T,g)=\infty$.

The infrared behavior of Green's functions in this case is determined then by the strong coupling limit of the theory. It