$$1$$
$$_0, t) =$$
$$\mathcal{T} e^{-\int_{t_0}^t H(t')dt'}$$
$$_0, t) =$$
$$\underline{\mathcal{T}} e^{-\int_{t_0}^t H(t')dt'}$$
$$\lim_{N\to\infty \Delta t\to 0} \exp\Big[-$$
$$H(t_{N-1})\Delta t\Big] \exp\Big[-$$
$$H(t_{N-2})\Delta t\Big] \cdots \exp\Big[-$$
$$H(t_0)\Delta t\Big]$$
$$=$$
$$\lim_{N\to\infty \Delta t\to 0} \prod_{j=0}^{N-1} \exp\Big[-$$
$$H(t_j)\Delta t\Big]$$
$$_j =$$
$$j\Delta t$$
$$N\Delta t =$$
$$t-$$
$$t_0$$
$$\overline{\overline{H}}_0$$
$$_0, t) =$$
$$\exp[-H_0(t-$$
$$t_0)]$$
??
??
$$\ddot{H}(t)$$
$$2$$
$$H(t)$$
$$t$$
$$\rangle =$$
$$E_n(t)|n(t)\rangle$$
$$E_n$$
$$\{|n(t)\rangle\}$$
$$t$$
$$\psi(t)\rangle =$$
$$\sum_n a_n(t) e^{\theta_n(t)} |n(t)\rangle$$
$$\theta_n(t) =$$
$$(-1/\hbar) \int^t dt' E_n(t')$$
$$|n(t)\rangle$$
$$|\psi(t)\rangle$$
$$\hbar \partial_t |\psi(t)\rangle =$$
$$H(t)|\psi(t)\rangle$$
??
$$\hbar \sum_n [(\dot{a}_n(t) +$$
$$a_n(t)\partial_t\theta_n(t)) e^{\theta_n(t)} +$$
$$a_n(t) e^{\theta_n(t)} \partial_t]|n(t)\rangle$$
$$=$$
$$\hbar \sum_n \dot{a}_n(t) e^{\theta_n(t)} |n(t)\rangle$$
$$+$$
$$\sum_n E_n(t) a_n(t) e^{\theta_n(t)} |n(t)\rangle$$
$$+$$
$$\hbar \sum_n a_n(t) e^{\theta_n(t)} \partial_t |n(t)\rangle$$
$$\sum_n E_n(t) a_n(t) e^{\theta_n(t)} |n(t)\rangle$$
$$\sum_n \dot{a}_n(t) e^{\theta_n(t)} |n(t)\rangle +$$
$$a_n(t) e^{\theta_n(t)} \partial_t |n(t)\rangle =$$
$$0$$
$$\langle m(t)|$$
$$\langle m(t)| \sum_n \dot{a}_n(t) e^{\theta_n(t)} |n(t)\rangle +$$
$$a_n(t) e^{\theta_n(t)} \partial_t |n(t)\rangle =$$
$$0$$
$$\dot{a}_m(t) =$$
$$-\sum_n a_n(t) e^{[\theta_n(t) - \theta_m(t)]} \langle m(t)|\partial_t n(t)\rangle$$
$$m \neq$$
$$n$$
$$\partial_t \langle m(t)|H(t)|n(t)\rangle =$$
$$\langle \partial_t m(t)|H(t)|n(t)\rangle$$
$$+$$
$$\langle m(t)|\partial_t H(t)|n(t)\rangle$$
$$_1$$