where the B(n) are unknown constants, independent of $q^2$; and where the parameter $\bar{q}^2$, with $\bar{q}^2 > \mu^2$, has been supplied to guarantee that the moment exists for all $q^2 \geq 0$. Define

$$f(-n) = -a_n . \tag{9}$$

Then

$$\sigma < \frac{G^2}{2\pi} B(-\gamma) \int_0^{2m\varepsilon} dq^2 \left(\frac{2m\varepsilon}{q^2}\right)^{1-\gamma} \left[\log\left(\frac{q^2+\bar{q}^2}{\mu^2}\right)\right]^{f(\gamma)}$$

$$< \frac{G^2}{2\pi\gamma} B(-\gamma)\, 2m\varepsilon \left[\log\left(\frac{2m\varepsilon+\bar{q}^2}{\mu^2}\right)\right]^{f(\gamma)} , \tag{10}$$

for all $\gamma$ in the interval $0 < \gamma < n_0$. We now invoke the result that the leading spin two (n = 0) operator in the Wilson expansion is the stress tensor, an SU(3) singlet with canonical dimensions. This implies that $a_n$ vanishes at n = 0 and becomes negative for n < 0. For the range of $\gamma$ involved in Eq. (10), this means that $f(\gamma)$ is positive. However $f(\gamma)$ can be made arbitrarily small by allowing $\gamma$ to approach zero as closely as one wishes. We therefore conclude that $\sigma/\varepsilon$ grows with energy less rapidly that $(\ln\varepsilon)^{\delta}$, for $\delta$ positive but arbitrarily small.

(ii) <u>Lower Bound:</u> -

From the inequalities of Eq. (5) we see that

$$\sigma > \frac{G^2}{2\pi} \int_0^{2m\varepsilon} dq^2 \int_{q^2/2m\varepsilon}^{1} \frac{dx}{x} (1-y)^2 F_2(x, q^2). \tag{11}$$