18. 解：

$$f(x)=\begin{cases}\frac{x}{\sigma^2}e^{-\frac{x^2}{2\sigma^2}} & x>0\\ 0 & x\le 0\end{cases}$$

其中，$\sigma>0$

故，

$$\begin{aligned}E(X)&=\int_{-\infty}^{\infty}xf(x)dx\\&=\int_0^{\infty}\frac{x^2}{\sigma^2}e^{-\frac{x^2}{2\sigma^2}}dx\\&=\int_0^{\infty}-xde^{-\frac{x^2}{2\sigma^2}}\\&=-xe^{-\frac{x^2}{2\sigma^2}}\Big|_0^{\infty}+\int_0^{\infty}e^{-\frac{x^2}{2\sigma^2}}dx\\&=0+\sqrt{2\pi}\sigma\int_0^{\infty}\frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{x^2}{2\sigma^2}}dx\\&=\sqrt{\frac{\pi}{2}}\sigma\\D(X)&=E(X^2)-E^2(X)\\&=\int_0^{\infty}\frac{x^3}{\sigma^2}e^{-\frac{x^2}{2\sigma^2}}dx-\frac{\pi\sigma^2}{2}\\&=\int_0^{\infty}-x^2de^{-\frac{x^2}{2\sigma^2}}-\frac{\pi\sigma^2}{2}\\&=-x^2e^{-\frac{x^2}{2\sigma^2}}\Big|_0^{\infty}+\int_0^{\infty}e^{-\frac{x^2}{2\sigma^2}}dx^2-\frac{\pi\sigma^2}{2}\\&=0+(-2\sigma^2e^{-\frac{x^2}{2\sigma^2}})\Big|_0^{\infty}-\frac{\pi\sigma^2}{2}\\&=\sigma^2(2-\frac{\pi}{2})\end{aligned}$$