ON CERTAIN THEOREMS IN OPERATIONAL CALCULUS.

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The object of this paper is twofold: firstly to establish certain theorems in Operational Calculus and secondly to obtain the Laplace transforms of several functions.

I.

1. Let us suppose [1]

$$\Phi(p) = p \int_0^\infty e^{-pt} f(t)\, dt \tag{1}$$

where p is a positive number (or a number whose real part is positive) and the integral on the right converges. We shall then say that $\Phi(p)$ is operationally related to $f(t)$ and symbolically

$$\Phi(p) \doteqdot f(t) \text{ or } f(t) \doteqdot \Phi(p). \tag{2}$$

Many interesting relations involving $\Phi(p)$ and $f(t)$ have been obtained. The following will be required in the sequel.

$$p\,\Phi(p) \doteqdot \frac{d}{dt} f(t), \text{ if } f(0) = 0 \tag{3}$$

$$p \frac{d}{dp}[\Phi(p)] \doteqdot -t \frac{d}{dt} f(t) \tag{4}$$

$$\frac{\Phi(p)}{p} \doteqdot \int_0^t f(t)\, dt \tag{5}$$

$$p \int_0^\infty \frac{\Phi(p)}{p}\, dp \doteqdot \frac{f(t)}{t} \tag{6}$$

$$p \frac{d}{dp}\left[\frac{\Phi(p)}{p}\right] \doteqdot -t f(t). \tag{7}$$

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