1. Show that

$$\mu_o + \mu_1 x + \frac{\mu_2 x^2}{2!} + \ldots = e^x \left(\mu_o + x\Delta\mu_o + \frac{x^2 \Delta^2 \mu_o}{2!} + \ldots \right)$$

Given

$$E\,\mu_i = \mu_{i+1}$$

2. Though less common, finite-difference can be used to present integrals. If we define the operator, J, as

$$J\left(f(x_o)\right) = \int_{x_o}^{x_o+h} f(t)dt$$

Prove that

$$J\left(f(x_o)\right) = \frac{h\Delta\left(f(x_o)\right)}{\left(\Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \ldots\right)}$$

3. Show that for an integer x if f(x) is defined as

$$f(x) = \frac{1}{x(x+1)(x+2)\ldots(x+m-1)}$$

then

$$\Delta f(x) = \frac{-m}{x(x+1)(x+2)\ldots(x+m)}$$

4. Show that

a. $$\Delta\left(\frac{\mu_x}{V_x}\right) = \frac{V_x \Delta \mu_x - \mu_x \Delta V_x}{V_x V_{x+1}}$$

b. $$\Delta \tan f(x) = \frac{\sin(\Delta f(x))}{\cos(f(x+h))\cos(f(x))}$$

where h is the increment

5. Using the first term then the first and second terms of the D-δ Series obtain two approximations for

$$\frac{\delta}{\delta x}\left(f(x)\, g(x) \frac{\delta P}{\delta x}\right)_{x=x_i}$$