21 October 2021

$$\pi e^{-a} \to \frac{\pi}{e}$$

$$\frac{d(\alpha y)}{dx} = \alpha S$$

$$\alpha y = \int^{x} \alpha(x') S(x') dx'$$

$$y = \frac{1}{\alpha(x)} \int_{x_0}^{x} \alpha S \, dx'$$

$$\frac{1}{(x-1)(x+1)}$$

$a_{j+2} = 0$ if $\lambda = j(j+1$

$$\frac{W'}{W} = -P(x)$$

$$\log \frac{W(x)}{W(0)} = -\int_0^x P(x')\,dx'$$

$$W(x) = W(x_0)\, e^{-\int_{x_0}^{x} P(x')\,dx'}$$

$$(v, Lu) = \int (Lv)\, u\, dx = (Lv, u)$$

$$(v, Lu) = (\underbrace{L^{+} v, u) = (Lv}, u)$$

self adjoint

$u_1(a) = 0 \qquad u_2(a) = 0$

$\alpha u_1(a) + \beta u_2(a) = 0$

$$= \int (Lv)\,u\,dx = (Lv, u)$$

$$L = -\frac{d}{dx}\left(p(x)\frac{d}{dx}\right) + q(x)$$

$$q = 0 \qquad p = 1$$

$$L = -\frac{d^2}{dx^2}$$

$$Lu = -u'' = \lambda u$$

$$(-\pi, \pi)$$

$$p = 1 - x^2 \qquad u = x^n$$

$$\int dx\, x^2 u^2 = \int dx\, x^2 x^{2n}$$

$$x^{2n+2} \sim \frac{1}{x^\alpha} = x^{-\alpha} \quad \alpha > 1$$

$$2n+2 = -\alpha < -1$$

$$2n < -3$$

$$n < -3/2$$

$$= -\exp(\,)\frac{d^2}{dx^2} - \frac{h_1}{h_2}\exp(\,)\frac{d}{dx}$$

$$-\exp(\,)\frac{h_0}{h_2}$$

$$\frac{p'(x)}{p(x)} = \frac{d}{dx}\log p(x)$$

$$\log p(x) - \log p(x_0)$$

$$= \log\left(\frac{p(x)}{p(x_0)}\right)$$

$$y_2(x) = y_1(x) \int^x \frac{W(x')}{\ldots} dx'$$

$$= y_2(x)\left[I(x) - I(c) \right]$$

$$Ay'' + By' + Cy = 0$$

$$y'' + \frac{B}{A}y' + \frac{C}{A}y = 0$$

$$S^* - \frac{i}{2}h^{*\prime}(x) - (ih)^{*\prime} = S + \frac{ih'}{2}$$

$$-\frac{i}{2}h' + ih' =$$

$$L_i = \epsilon_{ijk}\, x_j \frac{\hbar}{i}\frac{\partial}{\partial x_k}$$

$$|\psi(x)|^2 dx = P(x)$$

$$1 = \int P\, dx = \int |\varphi(x)|^2 dx$$

$$\int_0^\infty dr\, r^2 u^2(r) < \infty$$

$$\rho(r) = r^2$$