

Newton-Raphson method to find x

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \quad \text{where } f(x_n) = -x_n e^{2x_n}$$

$$f'(x_n) = -1 - 2e^{2x_n}$$

put $x_0 = -\frac{1}{2}$

$$x_1 = -\frac{1}{2} - \frac{(+\frac{1}{2} - e^{-1})}{(-1 - 2e^{-1})} = -\frac{1}{2} + \frac{0.1321}{1.7356} = 0.4239$$

$$x_2 = -0.4239 - \frac{(0.4239 - e^{-0.8478})}{(-1 - 2e^{-0.8478})} = -0.4239 + \frac{0.0045}{1.8567}$$

$$= -0.4255$$

$$x_3 = -0.4255 - \frac{(0.4255 - e^{-0.851})}{(-1 - 2e^{-0.851})} = -0.4255 + \frac{0.0015}{1.854}$$

$$= -0.4263$$

x_2 and x_3 agree to 3dp $\therefore x \approx -0.426$

Yes! further too!

Graph

