5.3 Ex. 2, p. 4

$f(x) = x e^{2x}$ Note $f(x) = u(x) \cdot v(x)$

where $u(x) = x$

$v(x) = e^{2x} \Rightarrow v'(x) = \frac{d}{dx} e^{u}$

where $u = 2x$

$\therefore v'(x) = 2e^{2x}$

$\therefore$ use product rule to find derivative of $f(x)$

$f'(x) = u'(x)v(x) + u(x)v'(x)$

$= (1)e^{2x} + x(2e^{2x})$

$= (2x+1)e^{2x}$ shown

find the smallest, largest

$\therefore$ (1) find critical point $\Rightarrow f'(x) = 0$

$(2x+1)e^{2x} = 0$

Note that e^{2x} will never be zero (see clearly from graph shape) P. 2

$\therefore 2x+1 = 0$

$x = -\frac{1}{2}$

(2) find $f(x)$ when x are at the critical point and both ends of domain

$f(-1) = (-1)e^{-2} \approx -0.135$

$f(-\frac{1}{2}) = (-\frac{1}{2})e^{-(1/2 \cdot 2)} = -\frac{1}{2}e^{-1} = -0.184 \Rightarrow$ minimum = smallest

$f(1) = (1)e^{2} \approx 7.39 \Rightarrow$ maximum (although not a critical point) = largest in the given range