2a) $\sum_{n=3}^{\infty} ne^{-n/2}$

Product rule:

$y' = 1e^{-n/2} + (-\frac{1}{2}n^{-n/2}) = $ (a negative number) $\rightarrow$ function decreases

$\boxed{1e^{-n/2} - \frac{n}{2}e^{-n/2}}$

$\int xe^{-x/2}\,dx$

	D	I
+	x	$e^{-x/2}$
−	1	$\frac{e^{-x/2}}{-\frac{1}{2}}$
+	0	$\frac{e^{-x/2}}{\frac{1}{4}}$

~~$u = e^{-\frac{x}{2}}$ $dv = x$~~

~~$du = -\frac{1}{2}e^{-\frac{x}{2}}$ $v = \frac{x^2}{2}$~~

$x\left(\frac{e^{-x/2}}{-\frac{1}{2}}\right) - \frac{1e^{-x/2}}{1/4}$

$-2xe^{-x/2} - 4e^{-x/2}$

$\lim_{n\to\infty} -2e^{-x/2}(x-2)$

$\lim_{n\to\infty} \frac{-2(n-2)}{e^{n/2}}$

L.H Rule

$\frac{-2}{\frac{1}{2}e^{n/2}} = \frac{-2}{\infty} = 0$

(b) $\sum_{n=3}^{\infty} \frac{ne^{n/2}}{1+e^n}$

$a_n = \frac{ne^{n/2}}{1+e^n}$ $\quad$ $b_n = \frac{e^{n/2}}{e^n}$

$b_n = \frac{1}{e^{\frac{1}{2}n}} = 0$

$a_n = 0$

Both Converge.