Course	Student ID	Test
MATH 1C	13572468	QUIZ 1

Question	2a	2b
Points	2	0
	MAX: 6½	MAX: 2½

Question	3a	3b	3c
Points	7	6½	6
	MAX: 9	MAX: 9½	MAX: 7½

Total	21½
	MAX: 35

[2][a] $a_{n+1} - a_n = \boxed{\frac{6^{n+1}}{(2n+3)!} - \frac{6^n}{(2n+1)!}}$ (1)

$= \boxed{\frac{6^{n+1} - 6^n(2n+3)(2n+2)}{(2n+3)!}}$ (1)

$= \frac{6^n(6 - (2n+3)(2n+2))}{(2n+3)!}$

$= \frac{6^n(-4n^2 + 10n + 12)}{(2n+3)!}$

$= \frac{-6^n(4n^2 - 10n - 12)}{(2n+3)!}$?

[6] $\left(\frac{x-6}{2x-7}\right)' = \frac{1(2x-7)-(x-6)2}{(2x-7)^2} = \frac{5}{(2x-7)^2} > 0$

$f(x) = \frac{x-6}{2x-7}$ IS INCREASING

SO $\left\{\frac{n-6}{2n-7}\right\}$ IS INCREASING + MONOTONIC

[3] [a]

$$\frac{2n^2+n^{\frac{3}{7}}}{3n^2+n^{\frac{7}{3}}} \quad \boxed{\frac{2n^2}{n^{\frac{7}{3}}}} \quad \boxed{>0} \quad (\tfrac{1}{2}) \qquad \frac{2n^2}{n^{\frac{7}{3}}} = \frac{2}{n^{\frac{1}{3}}}$$

(1) $$\boxed{\lim_{n\to\infty} \frac{2n^2+n^{\frac{3}{7}}}{3n^2+n^{\frac{7}{3}}} \cdot \frac{n^{\frac{7}{3}}}{2n^2}} = \boxed{\lim_{n\to\infty} \frac{2+n^{-\frac{11}{7}}}{2} \cdot \frac{1}{3n^{-\frac{1}{3}}+1}} = \boxed{1} \quad (\tfrac{1}{2})$$ (1)

(½) $$\boxed{2\sum_{n=1}^{\infty} \frac{1}{n^{\frac{1}{3}}} \text{ DIV}}$$ (p-SERIES) (1)

SO (½) $$\boxed{\sum_{n=1}^{\infty} \frac{2n^2+\sqrt[7]{n^3}}{3n^2+\sqrt[3]{n^7}} \text{ DIV}}$$ (LIMIT COMPARISON) (1)

[b] $\lim_{n\to\infty}(2-e^{\frac{1}{n}})^n = e^{\lim_{n\to\infty} n\ln(2-e^{\frac{1}{n}})}$ (1) $= e^{-1}$ (1) $\neq 0$ ($\frac{1}{2}$)

SO ($\frac{1}{2}$) $\sum_{n=1}^{\infty}(2-e^{\frac{1}{n}})^n$ DIV (DIVERGENCE) (1)

$\lim_{x\to\infty} x\ln(2-e^{\frac{1}{x}}) = \lim_{x\to\infty} \frac{\ln(2-e^{\frac{1}{x}})}{\frac{1}{x}}$ (1) $= \lim_{x\to\infty} \frac{-e^{\frac{1}{x}}}{2-e^{\frac{1}{x}}}$ (1)

$= -1$ ($\frac{1}{2}$)

[c] $-1 \le \cos n \le 1$ (½)

$3 \le 7 - 4\cos n \le 11$ (1)

(1) $(7-4\cos n)e^{-n} \le 11e^{-n} = \frac{11}{e^n}$

(½) $11\sum_{n=1}^{\infty}\left(\frac{1}{e}\right)^n$ CONV (GEOMETRIC (1) $|r| = \frac{1}{e}$ (½))

SO $\sum_{n=1}^{\infty}(7-4\cos n)e^{-n}$ CONV (COMPARISON (1)) (½)