

#14 from Foerster's text. Yes you can use synthetic division or your CAS, but her is a reminder of good ol' LONG DIVISION.

Handwritten long division:

$$\begin{array}{r}
 x^2 + 4x + 7 \\
 x - 3 \overline{) x^3 + x^2 - 5x - 21} \\
 \underline{-(x^3 + 3x^2)} \\
 4x^2 - 5x \\
 \underline{-(4x^2 + 12x)} \\
 7x - 21 \\
 \underline{-(7x - 21)} \\
 0
 \end{array}$$

Handwritten equation:

$$y = x^2 + 4x + 7 \mid x \neq 3$$

Proove $\lim_{x \rightarrow 3} f_{14}(x) = 28$

Step

Rationale

$$\lim_{x \rightarrow 3} x^2 + 4x + 7$$

algebra (cancel)
 $x \neq 3$

$$= \lim_{x \rightarrow 3} x^2 + \lim_{x \rightarrow 3} 4x + \lim_{x \rightarrow 3} 7$$

Lim of Sum

$$= \lim_{x \rightarrow 3} x^2 + 4 \lim_{x \rightarrow 3} x + 7$$

Lim of const times a fun

Lim of a constant

$$= \lim_{x \rightarrow 3} x \cdot \lim_{x \rightarrow 3} x + 4(3) + 7$$

Lim of product

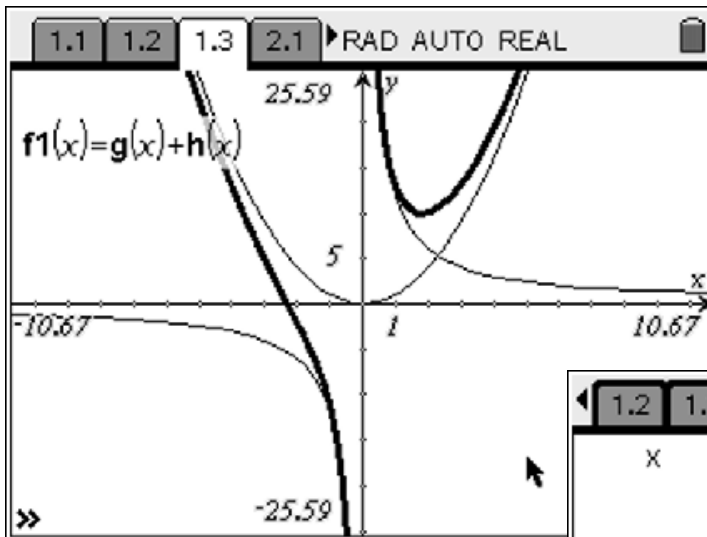
lim of identity

$$= (3)(3) + 12 + 7$$

Lim of identity

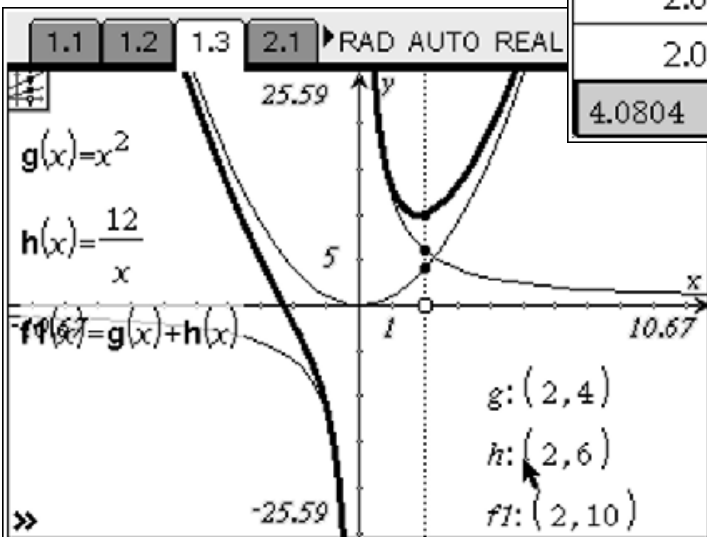
$$= 28$$

Q.E.D.



Let's graph and explore #1 & 5 with the TI-Nspire CAS

x	g(x):= x^2	h(x):= 12/x	f1(x):= g(x)+h(x)
1.98	3.9204	6.060606...	9.981006...
1.99	3.9601	6.030150...	9.990250...
2.	4.	6.	10.
2.01	4.0401	5.970149...	10.01024...
2.02	4.0804	5.940594...	10.02099...



limit of a sum property

1.4 2.1 2.2 2.3 ▸ RAD AUTO REAL

$f1(x)=x^2 \tan(x)$

Consider $\lim_{x \rightarrow 1.5} (f1(x))$ graphically,
numerically (table), and algebraically find the
delta for an epsilon of 0.01.

1.3 1.4 2.1 2.2 ▸ RAD AUTO REAL

x	f1(x):= x^2*tan(x)
1.499	31.24308...
1.5	31.72819...
1.501	32.22721...
1.502	32.74075...
1.503	33.26945...

1.4 2.1 2.2 2.3 ▸ RAD AUTO REAL

solve($f1(x)=31.738194881135,x$)| $1.49 < x < 1.5$ ▸

$x=1.50002032073$

solve($f1(x)=31.718194881135,x$)| $1.49 < x < 1.5$ ▸

$x=1.49997966759$

$1.5-1.4999796675853$ $2.03324147E-5$

$x=1.5000203207334-1.5$ $x=2.03207334E-5$

8/99

Epsilon Delta

Attachments

Sec2_3.tns