Name: Sol

PSID: _____

Calculus 1432
Quiz 9
March 21, 2014

2 points each

1. Give the LUB for $\{x \mid x^2 - 4x < 12\}$ $= \{x \mid x^2 - 4x - 12 < 0\} = \{x \mid (x-6)(x+2) < 0\}$

$= \{x \mid -2 < x < 6\}$

LUB = 6 , GLB = −2

2. Give the limit (if any) of the sequence $\left\{\frac{4n-1}{5n+3}\right\}_{n=1}^{\infty}$.

$P(n) = 4n-1$
$Q(n) = 5n+3$
have degree one $\Rightarrow \lim_{n\to\infty} \frac{P(n)}{Q(n)} = \boxed{\frac{4}{5}}$ (leading coefficient)

3. Give the limit (if any) of the sequence $\left\{(-1)^n\right\}_{n=1}^{\infty}$

$a_1 = -1 \quad a_3 = -1 \quad a_5 = -1$
$a_2 = 1 \quad a_4 = 1$

$\ldots -1, 1, -1, 1, -1 \ldots$ alternating

limit DNE

4. Give the limit (if any) of the sequence $\left\{\frac{1}{3^n}\right\}_{n=1}^{\infty}$

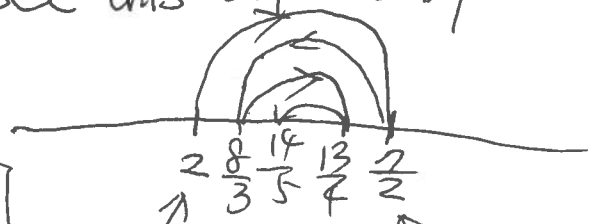
$\frac{1}{3^n} = \left(\frac{1}{3}\right)^n \to 0$ since $\frac{1}{3} < 1$

limit is 0

5. Determine whether the sequence is bounded and/or monotonic. Give the limit if any exists.

$\left\{\frac{3n+(-1)^n}{n}\right\}_{n=1}^{\infty}$

see this sequence by "number line"



bounded below + bounded above $\Rightarrow$ bounded

$a_1 = \frac{3+(-1)^1}{1} = 3-1 = 2$

$a_2 = \frac{6+(-1)^2}{2} = \frac{7}{2}$ ↓ increasing

$a_3 = \frac{9+(-1)^3}{3} = \frac{8}{3}$ ↓ decreasing

$a_4 = \frac{12+(-1)^4}{4} = \frac{13}{4}$ ↑ increasing

$a_5 = \frac{15+(-1)^5}{5} = \frac{14}{5}$ ↓ decreasing

$\Rightarrow$ monotone

Finally, $\frac{3n+(-1)^n}{n} = \frac{3n}{n} + \frac{(-1)^n}{n}$

$= 3 + \frac{(-1)^n}{n} \to 3 + 0 = 3$ as $n \to \infty$