Math 17A
Vogler
Discussion Sheet 3

1.) Determine a formula (starting with $n = 0$) for each of the following sequences.

a.) $(1+1)^2, (1+1/2)^3, (1+1/3)^4, (1+1/4)^5, \cdots$

b.) $0, 1/5, 2/6, 3/7, 4/8, 5/9, \cdots$ c.) $1, 0, 1, 4, 9, 16, \cdots$

d.) $1, -8, 27, -64, 125, -216, \cdots$ e.) $3, 12, 27, 48, 75, 108, \cdots$

f.) $8, 10, 12, 14, 16, 18, \cdots$ g.) $5/2, 25/4, 125/6, 625/8, \cdots$

h.) $1/9, 1/3, 1, 3, 9, 27, \cdots$ i.) $1, 5, 10, 16, 23, 31, \cdots$

j.) $4, 2, 1, 1/2, 1/4, 1/8, \cdots$ k.) $0, 2, 6, 12, 20, 30, \cdots$

l.) $1, -5, 9, -13, 17, -21, \cdots$ m.) $-1, 1, -1, 1, -1, 1, \cdots$

n.) $1, -3, 1, -3, 1, -3, \cdots$ o.) $0, 0, 0, 6, 24, 60, 120, 210, \cdots$

3.) Use algebra to evaluate the following limits.

a.) $\lim_{x\to 1} \dfrac{x^2+3x-4}{x^2-x}$ b.) $\lim_{x\to -1} \dfrac{x^3+1}{x^2-1}$ c.) $\lim_{x\to 2} \dfrac{\sqrt{x+2}-x}{x-2}$

d.) $\lim_{x\to 1} \dfrac{x^6-1}{x^8-1}$ e.) $\lim_{x\to 7} \cos\dfrac{\pi}{2}x$ f.) $\lim_{x\to -1} \tan\dfrac{3\pi}{4}x$

g.) $\lim_{x\to\infty} \dfrac{3x-4}{3x+1000}$ h.) $\lim_{x\to\infty} \dfrac{2-x}{x^2+5}$ i.) $\lim_{x\to\infty} \dfrac{x^2-16}{x+16}$

j.) $\lim_{x\to 3^+} \dfrac{x+2}{x-3}$ k.) $\lim_{x\to 3^-} \dfrac{x+2}{x-3}$ l.) $\lim_{x\to 0^-} \dfrac{x-1}{x^2+x}$

m.) $\lim_{x\to\infty} (\sqrt{x+100}-\sqrt{x})$ n.) $\lim_{x\to -\infty} \dfrac{x}{\sqrt{x^2+1}}$

4.) Assume that the weight N (in lbs.) at time t (in years) of a chimpanzee is given by the growth model $N = \dfrac{200e^t}{36+4e^t}$ for $t \geq 0$.

a.) What is the chimp's weight at birth ? at 1 year ? at 2 years ?

b.) When will the chimp reach a weight of 10 pounds ? 40 pounds ?

c.) What weight can we expect the chimp to reach as $t \to \infty$?

d.) Use a graphing calculator to sketch this growth equation.

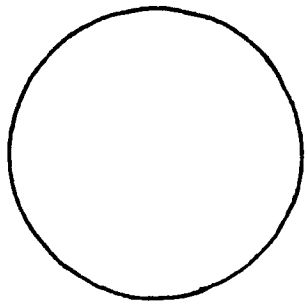
5.) Determine all constants A so that the $\lim_{x \to -1} f(x)$ exists :

$$f(x) = \begin{cases} x^2 + A \ , & \text{if } x < -1 \\ x + A^2 \ , & \text{if } x \geq -1 \end{cases}$$

6.) Determine if the following function is continuous at $x = 0$:

$$g(x) = \begin{cases} \ln(x + e) \ , & \text{if } x > 0 \\ 1 \ , & \text{if } x = 0 \\ \frac{e^x + e^{-x}}{2} \ , & \text{if } x < 0 \end{cases}$$

7.) What is the maximum number of distinct, non-overlapping parts into which a circle can be divided using 100 (non-parallel) lines ?



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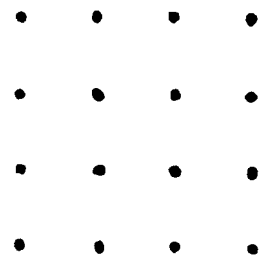
The following problem is for recreational purposes only.

8.) Without lifting your pencil, join all 16 dots with 6 straight lines.



Thanks to Dr. Kouba