Homework assignment 1:
Suggested due date: Friday, January 29 2016 at 3:30pm

1. Compute the exact values for
   a. $\sum_{i=-1}^{4} 3$
   b. $\sum_{i=1}^{5} \left(\frac{1}{3}\right)^i$
   c. $\sum_{i=1}^{n} 3$
   d. $\sum_{i=-3}^{n} 3$
   e. $\sum_{i=4}^{n} 3$
   f. $\sum_{k=0}^{n} 2^k$
   g. $\sum_{k=1}^{n} 2^k$
   h. $\sum_{k=5}^{n} 2^k$
   i. $\sum_{i=0}^{n} \left(\frac{2}{3}\right)^i$
   j. $\sum_{i=-4}^{n} \left(\frac{2}{3}\right)^i$
   k. $\sum_{i=-6}^{n} \left(\frac{2}{3}\right)^i$

l. $\sum_{i=1}^{n} i^3 + 2i^2 - i + 1$

m. $\sum_{i=1}^{n} -4i + \frac{i}{5}$

n. $\sum_{j=1}^{k} \sum_{i=1}^{j} i - j^2 - 2$

o. $\sum_{j=1}^{m} \sum_{k=1}^{j} 3C + k - 3j + i$

p. $\sum_{l=1}^{n} \sum_{j=1}^{k} \sum_{i=1}^{j} i - 4$

2. Calculate the answer (do not use any calculators) (**log3=1.5**)

a. $\log_4 x = 5 \rightarrow x = ?$

b. $\log_3 y = 4 \rightarrow y = ?$

c. $\log_6 x = 2 \rightarrow x = ?$

d. $\log_{10} z = 7 \rightarrow z = ?$

e. $x = 7^2 \rightarrow \log_7 x = ?$

f. $x = 32 \rightarrow \log x = ?$

g. $x = 125 \rightarrow \log_5 x = ?$

h. $2^{\log 5} + 4^{\log 6} - 27^{\log_3 5}$

i. $9^{\log_3 2} - 25^{\log_5 4} - 36^{\log_6 7} + 8^{\log_8 6}$

j. $\log(4^5 \times 8^3) - \log(16 - 8) + \log(\frac{2^{10}}{4 \times 3^2})$

k. $\log(3^2 \times 64^3) - \log(\frac{2^{10} \times 128^3}{9 \times 8^2})$

l. $\log\log 16$

m. $\log 16 \times \log 16$ Compare your answer with part l.

n. $\log^2 16$ Compare your answer with parts l and m.

o. $\log 16 \times \log 16 \times \log 16$

p. $\log_2 \log_5 625 - \log_3 \log_4 2^{3^9} + \log^4 2^5 - \frac{\log^2(4^3 \times 3^5)}{\log_5 125}$

q. $\log\log_8 \log 256 + \log^5(3^2) \times 4^{\log 7}$

r. $\log_6 x = 5 \rightarrow \log_x 6 \ = ?$

s. $\log_y x = 10 \rightarrow \log_x y \ = ?$

t. $\log_x 9 = 5 \rightarrow \log_9 x \ = ?$

u. $\log_4 32 - \log_8{}^2 4$

v. $\log_4 8 + \log_9 27 - \log_{25}{}^2 125 - \log_8{}^3 16 + \log_4 \log 256$

3. Compute the derivative of

a. $-5x^3 + 2x - 1$

b. $3x^4 - 2\sqrt{x} + x^{1/2} - 6x^{-2/3} - 5$

c. $x\sqrt{x} + \sqrt{\sqrt{x}}$

d. $\log x - x^2 \ln x + \ln x^4$

e. $\ln^3(x\sqrt{2x-3}) + \sqrt{\ln x^2}$

f. $\dfrac{\sqrt{x+5} - \ln x}{(x-1)^3}$

g. $\dfrac{\sqrt{(x\sqrt{x})\ln^2(3x-7)}}{\sqrt[8]{5x}}$

h. $-\tan(x^4 - 6) + x\sin x - \dfrac{(\log x)(\cot x)}{x+2} - 467k$

4. Determine the limit of

a. $\lim\limits_{x \longrightarrow \infty} \dfrac{3x+2}{-5x-6}$

b. $\lim\limits_{x \longrightarrow \infty} \ln x$

c. $\lim\limits_{x \longrightarrow \infty} (\dfrac{1}{x} + 3)$

d. $\lim\limits_{x \longrightarrow \infty} \dfrac{3x \log x + 2}{\sqrt{x^3} + 7x}$

e. $\lim_{x \longrightarrow \infty} \frac{\sqrt{x\sqrt{x}}}{\sqrt{\frac{2}{x}+\log(x^3-4\sqrt{x})}}$

f. $\lim_{x \longrightarrow \infty} \frac{x^3+x-\sqrt{3x}}{\sqrt{x}}$

g. $\lim_{x \longrightarrow \infty} \frac{x^3+x-\sqrt{3x}}{5x^{2.25}\sqrt{\sqrt{x}}}$

h. $\lim_{x \longrightarrow \infty} \frac{\frac{1}{x^3}}{\frac{\sqrt{x}}{x^4}}$

i. $\lim_{x \longrightarrow \infty} \frac{x^{0.1}-\sqrt{3}}{\sqrt{\sqrt{x}}}$

j. $\lim_{x \longrightarrow \infty} \frac{x^x}{2^x}$

k. $\lim_{x \longrightarrow \infty} \frac{x^x}{x(2^x)}$

l. $\lim_{x \longrightarrow \infty} \frac{x^{1/x}}{x^a}$

m. $\lim_{x \longrightarrow \infty} \frac{\log x^{\log x}}{x^{1/5}}$

n. $\lim_{x \longrightarrow \infty} \frac{\sqrt{2}^{\log^4 x^3}}{\log(2x+7)}$

o. $\lim_{x\longrightarrow\infty}\frac{2x^3+\log x-10x}{\frac{x^4}{\ln x}}$

p. $\lim_{x\longrightarrow\infty}\frac{\frac{x+1}{3x^{\ln x}}}{2x^2}$

q. $\lim_{x\longrightarrow\infty}\frac{\sin(x)}{\ln x+2}$

r. $\lim_{x\longrightarrow\infty}\frac{\sqrt{2}^{\log x^3}}{\log^{\ln x}(2x)}$

5. Compute the exact values for

a. $\int_1^n (x+1)dx$

b. $\int_1^n (2x+10)dx$

c. $\int_1^n (x^4+\sqrt{x})dx$

d. $\int_1^n (Cx^3-\frac{1}{x^2})dx$

e. $\int_1^n (x^4-3x^2+\frac{1}{x})dx$

f. $\int_1^n (\frac{3}{\sqrt{x}}+\ln x+e^x)dx$

g. $\int_1^n xe^x dx$

h. $\int_1^n x\ln x dx$

i. $\int_1^n \ln x dx$

j. $\int_1^n \sin x dx$

k. $\int_1^n x \sin x dx$

6. Use mathematical induction to prove that

$$1 + 2 + \cdots + n = \frac{n(n+1)}{2}$$

7. Use mathematical induction to prove that

$$1 + 2^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$$