

**Homework assignment 1:****Suggested due date:** Friday, September 8, 2017 at 03:30pm

1. Compute the 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.  $\sum_{k=0}^n 2^k + \sum_{k=5}^n 2^k$

f.  $\sum_{i=0}^n \left(\frac{2}{3}\right)^i + \sum_{i=-4}^n \left(\frac{2}{3}\right)^i$

g.  $\sum_{i=1}^n (i^3 + 2i^2 - i + 1)$

h.  $\sum_{i=5}^n \left(-4i + \frac{i}{5}\right)$

i.  $\sum_{j=0}^k \sum_{i=1}^j (i - j^2 - 2)$

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

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

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

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

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

- f.  $x = 125 \rightarrow \log_5 x = ?$
- g.  $2^{\log 5} + 4^{\log 6} - 27^{\log_3 5}$
- h.  $9^{\log_3 2} - 25^{\log_5 4} - 36^{\log_6 7} + 8^{\log_8 6}$
- i.  $\log(4^5 \times 8^3) - \log(16 - 8) + \log\left(\frac{2^{10}}{4 \times 3^2}\right)$
- j.  $\log(3^2 \times 64^3) - \log\left(\frac{2^{10} \times 128^3}{9 \times 8^2}\right)$
- k.  $\log \log 16$
- l.  $\log 16 \times \log 16$  Compare your answer with part l.
- m.  $\log^2 16$  Compare your answer with parts l and m.
- n.  $\log 16 \times \log 16 \times \log 16$
- o.  $\log_2 \log_5 625 - \log_3 \log_4 2^{3^9} + \log^4 2^5 - \frac{\log^2(4^3 \times 3^5)}{\log_5 125}$
- p.  $\log \log_8 \log 256 + \log^5(3^2) \times 4^{\log 7}$
- q.  $\log_6 x = 5 \rightarrow \log_x 6 = ?$
- r.  $\log_y x = 10 \rightarrow \log_x y = ?$
- s.  $\log_x 9 = 5 \rightarrow \log_9 x = ?$
- t.  $\log_4 32 - \log_8^2 4$
- u.  $\log_4 8 + \log_9 27 - \log_{25}^2 125 - \log_8^3 16 + \log_4 \log 256$

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.  $\frac{\sqrt[4]{x+5} - \ln x}{(x-1)^3}$
- g.  $-\tan(x^4 - 6) + x \sin x - \frac{(\log x)}{x-1} - 467k$

4. Determine the limit of

a.  $\lim_{x \rightarrow \infty} \frac{3x+2}{-5x-6}$

b.  $\lim_{x \rightarrow \infty} \ln x$

c.  $\lim_{x \rightarrow \infty} \left(\frac{1}{x} + 3\right)$

d.  $\lim_{x \rightarrow \infty} \frac{3x \log x + 2}{\sqrt{x^3} + 7x}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5. Compute the exact values for

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

$$b. \quad \int_1^n (2x^4 + 5\sqrt{x})dx$$

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

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

$$e. \quad \int_1^n xe^x dx$$

$$f. \quad \int_1^n (x \ln x - 4 \ln x)dx$$

g.  $\int_1^n -2 \sin x dx$

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

6. Use mathematical induction to prove that

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

7. Use mathematical induction to prove that

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