Department of Electrical and Computer Engineering
University of Waterloo
Please send any comments or criticisms to dwharder@alumni.uwaterloo.ca
with the subject ECE 250 Questions 1.2.
Assistances and comments will be acknowledged.

1.2*a* ∞ , ∞ , 0 , ∞ , ∞ , 0 .

1.2*b* No, instead you should consider $\lim_{n\to\infty}\frac{e^n}{2^n}=\lim_{n\to\infty}\left(\frac{e}{2}\right)^n$, at which point we note $\frac{e}{2}>1$.

1.2*c* ii and iii.

1.2*d* 16 MB, 8 GiB and 4 KiB.

1.2*e* 25 × 51 = 1275 and 50 × 101 – 1275 = 3775.

1.2*f* $\frac{30^3}{3}=9000$ and $\sum_{k=0}^{100}k^3\;\frac{100^4}{4}=25\times 1000\,000=25\,000\,000$.

1.2*g* 1

1.2*h* When $N = 0$, the left side is 0 and $2+(0-1)2^1=0$. Assuming it is true for an arbitrary N,

$$\begin{aligned}\sum_{k=0}^{N+1}k2^k &= (N+1)2^{N+1}+\sum_{k=0}^{N}k2^k\\ &= (N+1)2^{(N+1)}+2+(N-1)2^{N+1}\\ &= 2+2N2^{(N+1)}\\ &= 2+((N+1)-1)2^{(N+1)+1}\end{aligned}$$

which is the value of the formula for $N + 1$.

1.2*i* Yes, as it samples the value of the function at four points and the sum of the weights equals 1. An approximately of the value of the function on an interval times the width of the interval is an approximation of the area of the function, so yes. The approximation is 1.3426⋯ while the actual answer is 1.3414⋯.

1.2*j* 99 × 50 = 4950.