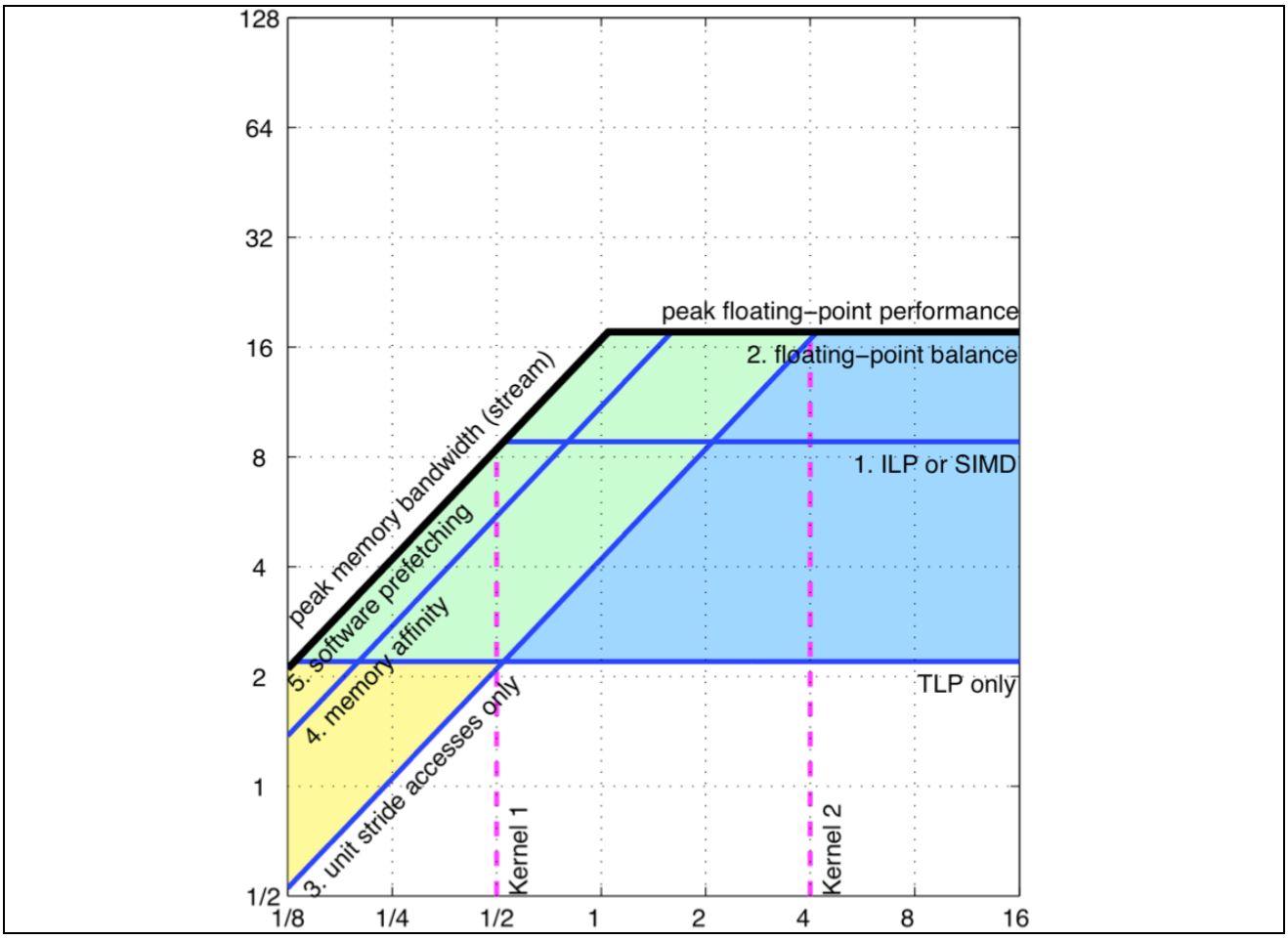
National University of Computer and Emerging Sciences
Lahore Campus

Quiz 3
Total Marks : 5
Time allowed: 5 Minute

Q1: [5 Marks] In the context of Roofline model:

(a) What is on the x-axis?
(b) What is on the y-axis?
(c) What is the ridge of the roofline?
(d) How kernel 1 can achieve its maximum y-value?
(e) How kernel 2 can achieve its maximum y-value?



Solution:

(a) **[0.5 marks]** Arithmetic Intensity
(b) **[0.5 marks]** FLOPS per second
(c) **[0.5 marks]** Ridge is the point where slanted and horizontal roof lines meet. Its significance is that just to the left of it the workload are memory-bandwith bound while to the right of it are compute-bound.
(d) **[2 marks]** Do unit stride accesses, then TLP, then memory affinity, and then software prefetching to achieve 8 GFLOPS per second.

(e) **[1.5 marks]** Do TLP, then ILP or SIMD, and then floating-point balance to achieve best possible value of 16 GFlOPS per second.