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1. A: Maximum speedup = T_s / T_p = (t_0 + t_1) / (t_0 + t_1 / p)
   Maximum efficiency = S_p/ x = (t_0 + t_1) /(t_0*1 + t_1) = 1
   B: Maximum speedup = T_s / T_p = (t_0 + t_1) / (t_0 + t_1 / ∞) = (t_0 + t_1)/t_0
   Maximum efficiency = S_p/ x = (t_0 + t_1) /(t_0*∞ + t_1)
   C: Maximum speedup = (t_0 + t_1)/ 0 = 1/a

2. If(x_c < x_d): send message east
   else if(x_c > x_d): send message west
   else if(y_c < y_d): send message north
   else if (y_c > y_d): send message south
   else if(z_c < z_d): send message forward along z axis
   else if(z_c > z_d): send message backward along z axis
   else:
   dist(a,b) = (a-b+n) % n
   if(dist(x_c, x_d) < dist(x_d, x_c)): send message east
   else if(dist(x_c, x_d) > dist(x_d, x_c)): send message west
   else if (dist(y_c < y_d) < dist(y_d, y_c)): send message north
   else if (dist(y_c < y_d) > dist(y_d, y_c)): send message south
   else if (dist(z_c < z_d) < dist(z_d, z_c)): send message forward along z axis
   else if (dist(z_c < z_d) > dist(z_d, z_c)): send message backward along z axis

3. A. 16 * $2x10^9$ = 32 GB/s
   B. Pipeline will stall every 64 bytes so 80 cycles of latency will apply every 4 additions. 80/4 = 20 cycles of latency per addition. Maximum performance = 2GFLOPS per second/ 20

4. A. Minimal congestion: 2 because of extra link Dilation: N-2 because two edge nodes will be n-2 hops apart
   B. Minimal congestion: 2 Dilation: 2

5. (32 bytes / 100 MB/sec) + 500 nsec = (32 bytes / 100,000,000 bytes/sec) + 500 nsec = 3.2e-7 seconds + 500 nsec = 8.2e-7 seconds = 820 nanoseconds