Quiz: Lecture 2.7
Principles of Electronic Nanobiosensors
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Answer the five questions below by choosing the one, best answer.

1) A sensor based on the concept of diffusion in multiple dimensions would work only if the diffusion along the nanowire ($D_1$) is related to the diffusion in the fluid ($D_3$) in the following way.

a) $D_1 \sim D_3$.
   b) $D_1 \gg D_3$
   c) $D_1 \ll D_3$
   d) None of the above.

2) The Peclet number compares the following two quantities

a) Convective vs. diffusive flows.
   b) Inertial vs. dissipative flows.
   c) Viscous diffusion vs. thermal diffusion.
   d) Ballistic vs. diffusive flow.

3) In the context of a nanobiosensor, a large Peclet number implies

a) Larger flow rate.
   b) Smaller boundary layer.
   c) More effective overlap between the sensor and the fluid flow.
   d) All of the above.

4) Peclet number is inversely proportional to the diffusion coefficient of the biomolecule. Does it mean that increasing the diffusion coefficient of DNA by reducing its polymer chain length would

a) Reduce the sensor performance.
   b) Increase the sensor performance.
   c) Keep the sensor performance about the same.
   d) Does not matter, because diffusion is irrelevant in a fluidic channel.
5) If the size of the disk sensor reduces from 100 um to 1 um, the total flux captured by the smaller sensor will be smaller by a factor of (approximately)

a) 10  
b) 100  
c) 1000  
d) 1000000