This train has two cars.
Where do you expect
there will be more passengers?

1. The first car
2. The second car
3. About the same in both
4. What?

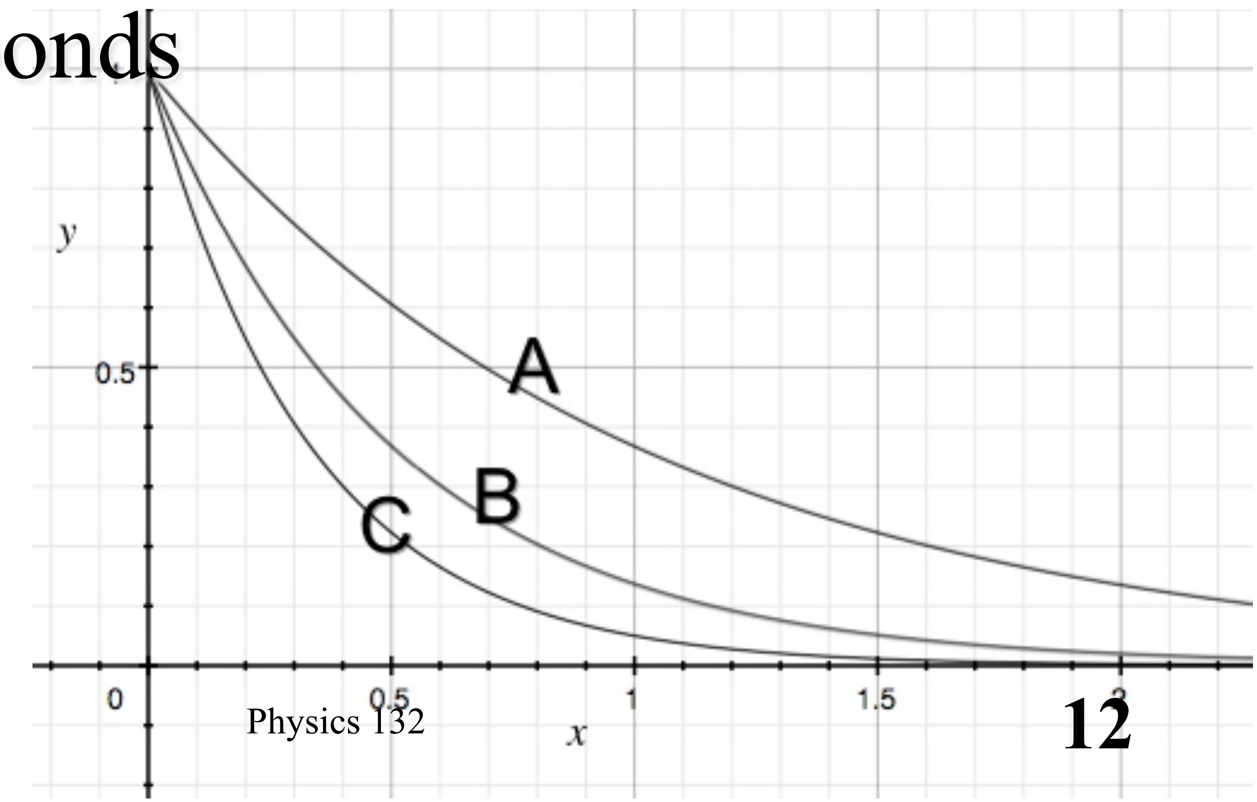
This train has two cars. Also, it costs $2 to ride in the first car, and $10 to ride in the second car .Where do you expect there will be more passengers?

1. The first car
2. The second car
3. About the same in both
4. What?

This train has two cars. Also, it costs $2 to ride in the first car, and $10 to ride in the second car. Also, everyone is a billionaire. Where do you expect there will be more passengers?

1. The first car
2. The second car
3. About the same in both
4. What?

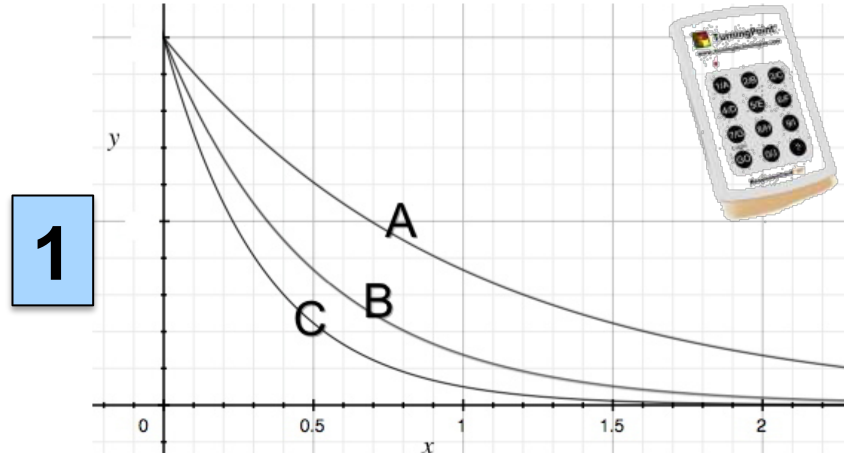
The Boltzmann factor, $e^{-\frac{\Delta E}{k_B T}}$, is proportional to the probability that a DoF will gain an energy ΔE from its interaction with a thermal bath. Which of the graphs of these **exponential factors** corresponds to the highest value of T?

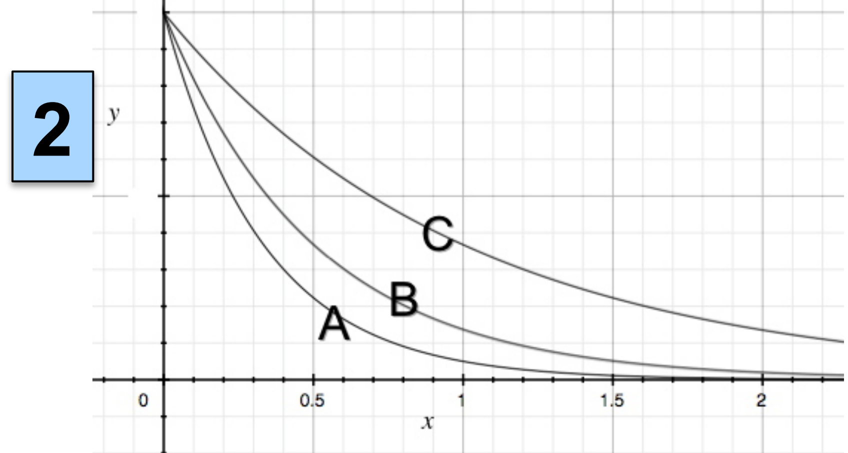


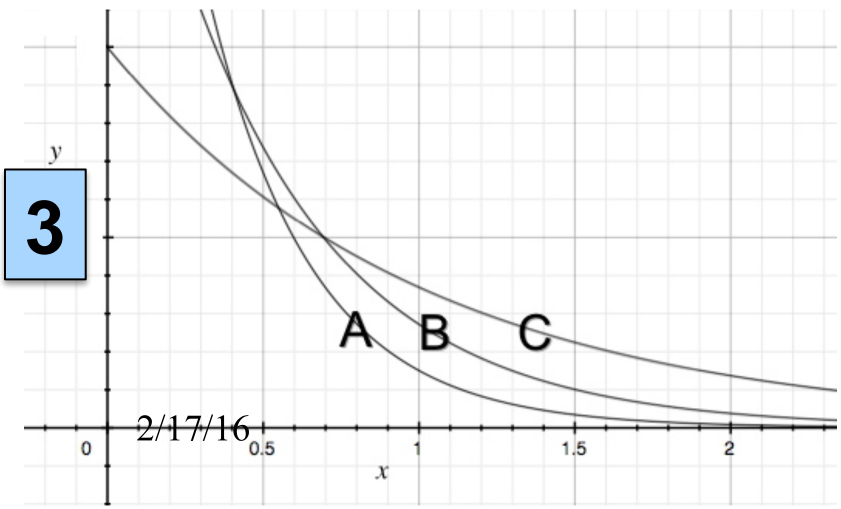
In the Boltzmann factor, $e^{-\frac{\Delta E}{k_B T}}$,
the dependence on "T" tells you that:

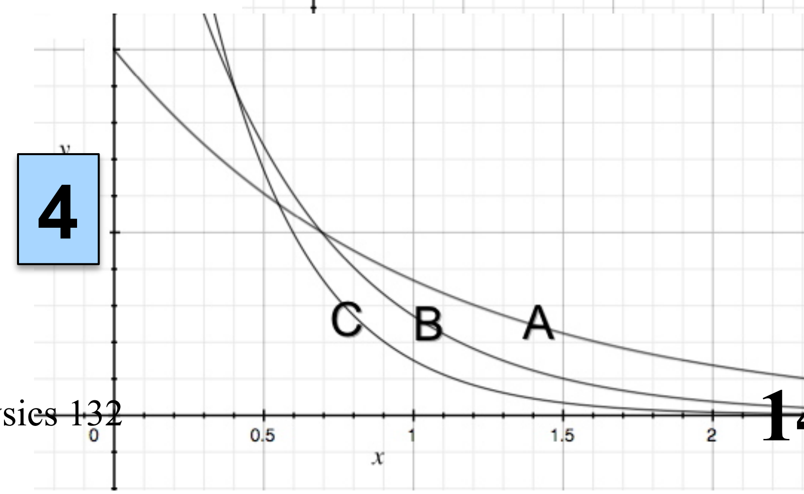
1. Higher-energy states are only possible above a certain temperature
2. Higher-energy states are only possible below a certain temperature
3. Higher-energy states become more probable as the temperature increases
4. Higher-energy states become more probable as the temperature decreases
5. None of these

On of the sets of graphs shows the **probability** that a DoF will gain an energy ΔE from its interaction with three different thermal baths: $T_A > T_B > T_C$. Which?









The probability that a DoF gains an energy probability that a DoF will gain an energy ΔE from its interaction with a thermal bath at temperature T is where $P_0(T)$ is a (temperature dependent) normalization factor.

$$P(\Delta E, T) = P_0(T)\, e^{-\frac{\Delta E}{k_B T}}$$

Which of the following statements are true?

A. Low energy gains are more probable at high T.
B. Low energy gains are more probable at low T.
C. High energy gains are more probable at high T.
D. High energy gains are more probable at low T.

A gas of molecules at room temperature interacts with the potential shown below. Each molecule can be in the state E_1 or E_2. If the gas is at STP and $E_1 - E_2 = 25$ meV, then at equilibrium, the number of molecules found in the state E_1 divided by the number of molecules found in the state E_2 will be

1. About 1
2. About 1/3
3. About 3
4. Much, much larger than 1
5. Much, much smaller than 1
6. Cannot be determined from the information given.