Assignment 11

1) An experiment is repeated five times and a quantity *X* is measured. The five readings are 4.8,4.9,5.1,4.7,5.3. The average value of $e^{X/5}$ based on these reading is closest to **1 point**

- 2.5
- 2.6
- 2.7
- 2.8

Accepted Answers:
2.7

2) An experiment is repeated five times and a quantity *X* is measured. The five readings are 4.8,4.9,5.1,4.7,5.3. The second moment of *X* based on these reading is closest to **1 point**

- 24.4
- 24.6
- 24.8
- 25.0

Accepted Answers:
24.6

3) A variable *x* satisfies the probability distribution $p(x) = \sqrt{1/\pi}e^{-x^2}$. The range of *x* is from $-\infty$ to ∞. The fifth moment of *x* is equal to **1 point**

- 0
- 1
- 5/4
- 4/5

Accepted Answers:
0

4) Consider a 1-D random walk on the integer line. Thus the position of the random walker can be any integer. The random walker starts at *x*=0. In each step, it hops to the right with probability 0.60 **1 point**

and to the left with probability 0.40. After 50 steps, the position of the particle on average is exactly equal to

- 20
- 25
- 30
- None of the above

Accepted Answers:
None of the above

5) A biased coin has proabability of heads of 0.7 and probability of tails of 0.3. The probability of getting exactly 7 heads in 10 tosses is closest to ***1 point***

- 0.7
- 0.5
- 0.25
- 1.0

Accepted Answers:
0.25

6) A certain radioactive species has a decay rate of 0.03 /year. In a sample containing 10^{15} nuclei, the probability that exactly *n* decay in *t* years is given by ***1 point***

- $(0.03t)^n e^{-0.03t}$
- $\frac{1}{n!} e^{-0.03t}$
- $\frac{(0.03t)^n}{n!} e^{-0.03t}$
- None of the above

Accepted Answers:
$\frac{(0.03t)^n}{n!} e^{-0.03t}$

7) A certain quantity *x* has a distribution given by ***1 point***
$p(x) = \frac{1}{\sqrt{\pi}} e^{-x^2}$
The standard deviation of *x* is equal to

- 1
- 2
- 1/2
- $1/\sqrt{2}$

Accepted Answers:
$1/\sqrt{2}$

8) A certain quantity *x* has a distribution given by ***1 point***
$p(x) = \frac{1}{\sqrt{\pi}} e$
The average value of is equal to

- 1
- 2

- 3/4
- 1/2

Accepted Answers:
3/4

9) For a particle in a 1-D box located between 0 and 2, the wavefunction in some state is given by **1 point**

$\psi(x) = \sin(2\pi x)$

The value of $\langle xp_x \rangle$ for his state is equal to

- 0
- 1
- $i\hbar$
- None of the above

Accepted Answers:
None of the above

10) For nitrogen gas (MW = 28) at 280K, the average value of $v_x^2 v_y^2$ is equal to (in terms of the ideal gas constant *R* expressed in mJ/mol K **1 point**

- 0
- 10 *R*
- $100R^2$
- None of the above

Accepted Answers:
$100R^2$