

### QAT Sample Questions (SET 2)

1. Solve the initial value problem  $y' + 2y = 0; y(0) = 4$ 
  - A.  $y = 4x$
  - B.  $y = 4\exp(-x)$
  - C.  $y = 4\sin(2x)$
  - D.  $y = 4\cos(2x)$
  - E.  $y = 4\exp(-2x)$
2. Solve the first order differential equation  $\cos(x)y' + y\sin(x) = 1$ 
  - A.  $y = c \tan(x)$
  - B.  $y = c \sec(x) + \operatorname{cosec}(x)$
  - C.  $y = \exp(x) + c x \exp(x)$
  - D.  $y = \sin(x) + c \tan(x)$
  - E.  $y = \sin(x) + c \cos(x)$
3. Let  $y' = 2xy$  be a differential equation with initial condition  $y = 2$  when  $x = 1$ . Approximate the solution at  $x = 1.1$  by performing one iteration of Euler's Method with  $\Delta x = 0.1$ 
  - A. 2.0
  - B. 2.1
  - C. 2.2
  - D. 2.4
  - E. 6.0
4. A gambler starting with \$100 plays a series of games. Each game he will win \$1 with probability  $2/5$ , and lose \$1 with probability  $3/5$ . What is the probability that he has \$101 after playing five games?
  - A. 0
  - B.  $72/3125$
  - C.  $72/625$
  - D.  $144/625$
  - E.  $72/125$
5. Suppose the probability that Sam is drunk on a given day is  $2/3$ . The probability that he will drive back home safely is  $1/5$  if he is drunk, and is  $3/5$  if he is not drunk. What is the probability that he is drunk today given that he drives back home safely?
  - A.  $1/5$
  - B.  $2/5$
  - C.  $1/2$
  - D.  $1/3$
  - E.  $2/3$

6. A survey is conducted on 100 people about their education background and work experience. There are 52 males and 48 females. 21 males and 12 females have no Bachelor degree and no work experience. There are 50 people with Bachelor degrees, and 60 people with work experience. What is the number of people with both Bachelor degrees and work experience out of these 100 people?
- A. 10
  - B. 33
  - C. 43
  - D. 57
  - E. 67

Use this data set for question 7 - 11.

We randomly collect price of food from 5 food stores in Chulalongkorn University. The prices are 30, 30, 22, 38, and 35. Use these numbers to help with your calculation.

$$\sqrt{4} = 2, \sqrt{5} = 2.2, \sqrt{7.4} = 2.7, \sqrt{5.92} = 2.4, \sqrt{29.6} = 5.4, \sqrt{37} = 6.2$$

7. What's the sample mean and sample variance?
- A. 30, 37
  - B. 30, 29.6
  - C. 31, 37
  - D. 31, 29.6
  - E. None of above
8. What's the range, median, and mode of this data set?
- A. 8, 30, 30
  - B. 8, 31, 31
  - C. 16, 30, 30
  - D. 16, 31, 30
  - E. 4, 30, 31
9. If a researcher said that the price of food at Chulalongkorn University is lower than 24, what could be the null hypothesis for this claim?
- A.  $H_0: \mu < 24$
  - B.  $H_0: \mu \leq 24$
  - C.  $H_0: \mu > 24$
  - D.  $H_0: \mu \geq 24$
  - E. None of above
10. What is the critical value that you use to reject the null hypothesis at 95% confidence level?
- A.  $t_{0.05,4}$
  - B.  $z_{0.05,4}$
  - C.  $t_{0.025,5}$
  - D.  $z_{0.025,5}$
  - E.  $t_{0.05,5}$

11. What is the approximate test statistics that you use for the hypothesis testing?
- A. 0.4
  - B. 0.5
  - C. 1.2
  - D. 2.5
  - E. 2.8
12. Anna is older than Smith. Arty is older than Anna but younger than Katie. Katie is older than Smith. Smith is younger than Arty and Ginny is the oldest. Age wise, who is in the middle?
- A. Smith
  - B. Anna
  - C. Arty
  - D. Katie
  - E. Ginny

Use this information for question 13 - 14.

ABC Corporation has eight staff in customer relationship department. Out of eight staff, there are three account executives (A, B, and C) and five assistants (D, E, F, G, and H). The company is planning to open a new office using three assistants and two account executives of the present staff. The company has to plan who the company will transfer to the new office because there are some constraints with the staffs. The constraints include:

- A. Account executive A and C cannot work together because they cannot get along at all so they should not be sent as a team to the new office.
  - B. C and E should be separated because once they talk to each other so much that they could not work efficiently.
  - C. D and G always fight when they work as a team, so they should not go together.
  - D. D and F are competing for promotion. They should be separated so it's easier for the company to evaluate them.
13. If A is to be moved as one of the account executives, which of the following cannot be a possible team?
- A. ABDEH
  - B. ABDGH
  - C. ABEFH
  - D. ABEGH
  - E. ABFGH

14. If D goes to the new office, which of the following is (are) true?
- I. C cannot go.
  - II. A cannot go.
  - III. H must also go.
- A. I only
  - B. II only
  - C. I and II only
  - D. I and III only
  - E. I, II, and III

List of symbols for Questions 15-17

| Symbol                | Description  |
|-----------------------|--|
| $\sim$                | Negation   |
| $\wedge$              | Logical 'and'  |
| $\vee$                | Logical 'or'   |
| $P \Rightarrow Q$     | $P$ is sufficient for $Q$ . $Q$ is necessary for $P$ |
| $P \Leftrightarrow Q$ | $P$ is equivalent to $Q$                             |
| $\forall x$           | For all $x$  |
| $\exists x$           | There exists an $x$                                  |

15. Which of the following statements is the most likely?
- A. Russell is studying for a Masters degree and works in a bank
  - B. Russell works in a bank and works as a bartender at night
  - C. Russell is good at math and works in a bank.
  - D. Russell works in a bank
  - E. Russell works in an insurance company or works in a bank
16. Consider the following sentence:

When AEC becomes effective in 2014, Thailand labor market will be greatly affected and Thailand trade volume with neighbor countries also should increase substantially.

$A$  = AEC becomes effective in 2014

$L$  = The labor market for Thailand will be greatly affected

$V$  = Trade volume with neighbor countries should increase substantially

Which of the follows is equivalent to the above sentence?

- A.  $(L \wedge V) \Rightarrow \sim A$
- B.  $\sim A \wedge (L \wedge V)$
- C.  $(\sim A \vee L) \wedge (A \vee \sim V)$
- D.  $(A \Rightarrow L) \wedge (A \Rightarrow V)$
- E.  $(\sim A \wedge L) \vee (V \wedge \sim A)$

17. Which of the following statements are true?

A: If the sun rises on the west, then water will flow upward

B:  $(e > 2.7) \wedge (\pi \times e < 9)$

C: If 3 is prime, then  $\pi$  is irrational

- A. A
- B. A, B
- C. B, C
- D. A, C
- E. A, B, C

**Solutions:**

1. E

2. E

3. D

4. D

5. B

6. C

7. C

8. C

9. D

10. A

11. D

12. C

13. B

14. D

15. E

16. D

17. E