Instituto de Ciência e Tecnologia
Instituto Tecnológico de Aeronáutica
Programa de Pós-Graduação em Pesquisa Operacional

Prova de Seleção - 1º semestre de 2019

26 de novembro de 2018

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Nome do candidato

Observações
1. Duração da prova: 90 minutos (uma hora e meia)
2. Não é permitido o uso de calculadora
3. Cada pergunta admite uma única resposta
4. Marque a alternativa que considerar correta na tabela abaixo
5. Utilize o verso das folhas para a resolução das questões

Questão	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Resp.																

Questões em Português

1. $(1+\sqrt{5})(1-\sqrt{5}) =$

(a) – 4

(b) 2

(c) 6

(d) $-4-2\sqrt{5}$

(e) 6 $-2\sqrt{5}$

2. Quantos minutos demora viajar 120 milhas em uma velocidade de 400 milhas por hora?

(a) 3

(b) 3 + 1/3

(c) 8 +2/3

(d) 12

(e) 18

3. Se os inteiros positivos *X* e *Y* não são ambos ímpares, qual dos seguintes deve ser par?

(a) *XY*

(b) $X + Y$

(c) $X - Y$

(d) $X + Y - 1$

(e) $2(X + Y) - 1$

4. No triângulo ABC da Figura 1, qual o valor de x em termos de z?

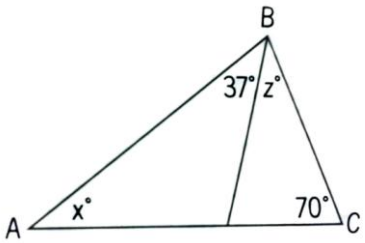

Figura 1: Triângulo ABC referente a questão 4

(a) $z + 73$

(b) $z - 73$

(c) $70 - z$

(d) $z - 70$

(e) $73 - z$

5. A expressão $\frac{61{,}24 \times (0{,}998)^2}{\sqrt{403}}$ é aproximadamente igual a

(a) 1

(b) 3

(c) 4

(d) 5

(e) 6

6. $\frac{1}{3 - \frac{1}{3 - \frac{1}{3-1}}} =$

(a) 7/23

(b) 5/13

(c) 2/3

(d) 23/7

(e) 13/5

7. Após a adição de 4.000 galões de água um tanque, que já estava cheio em 3/4 da sua capacidade, ficou cheio em 4/5 da sua capacidade. Qual a capacidade total do tanque, em galões de água?

(a) 5.000

(b) 6.200

(c) 20.000

(d) 40.000

(e) 80.000

8. Se $x^2 - 2x - 15 = 0$ e $x > 0$, quais expressões devem ter valor igual a zero?

I. $x^2 - 6x + 9$

II. $x^2 - 7x + 10$

III. $x^2 - 10x + 25$

(a) Somente I

(d) Somente II

(d) Somente III

(d) Somente II e III

(e) I, II e III

Questões em Inglês

9. The price of certain television set is discounted by 10 percent, and the reduced price is then discounted by 10 percent. This series of successive discounts is equivalent to a single discount of

(a) 20%

(b) 19%

(c) 18%

(d) 11%

(e) 10%

10. If there are 664,579 prime numbers among the first 10 million positive integers, approximately what percent of the first 10 million positive integers are prime numbers?

(a) 0.0066%

(b) 0.066%

(c) 0.66%

(d) 6.6%

(e) 66%

11. A certain manufacturer produces items for which the production cost consist of annual fixed costs totaling $130,000 and variable costs averaging $8 per item. If the manufacturer's selling price per item is $15, how many items must the manufacturer produce and sell to earn an annual profit of $150,000?

(a) 2,858

(b) 18,667

(c) 21,429

(d) 35,000

(e) 40,000

12. If X and Y are sets of integers, XΔY denotes a set of integers that belong to set X or set Y, but not both. If X consists of 10 integers, Y consists of 18 integers, and 6 of the integers are in both X and Y, then XΔY consists of how many integers?

(a) 6

(b) 16

(c) 22

(d) 30

(e) 17

13. A certain population of bacteria doubles every 10 minutes. If the number of bacteria in the population initially was 10^4, what was the number in the population 1 hour later?

(a) $2(10^4)$

(b) $6(10^4)$

(c) $(2^6)(10^4)$

(d) $(10^6)(10^4)$

(e) $(10^4)^6$

14. In a certain pond, 50 fish were caught, tagged, and returned to the pond. A few days later, 50 fish were caught again, of which 2 were found to have been tagged. If the percent of tagged fish in the second catch approximates the percent of tagged fish in the pod, what is the approximate number of fish in the pond?

(a) 400

(b) 625

(c) 1,250

(d) 2,500

(e) 10,000

15. A certain clock marks every hour by striking a number of times equal to the hour, and the time required for a stroke is exactly equal to the time interval between strokes. At 6:00 the time lapse between the beginning of the first stroke and the end of the last stroke is 22 seconds. At 12:00, how many seconds elapse between the beginning of the first stroke and the end of the last stroke?

(a) 72

(b) 50

(c) 48

(d) 46

(e) 44

16. In the sequence $x_0, x_1, x_2, \ldots, x_n$, each term from x_1 to x_k is greater than the previous term, and each term from x_{k+1} to x_n is 3 less the previous term, where k and n are positive integers and $k < n$. If $x_0 = x_n = 0$ and if $x_k = 15$, what is the value of n?

(a) 8

(b) 6

(c) 9

(d) 10

(e) 11