

***2018 OWLympiad Exam Practice***

*May 16, 2018*

*Rules:*

* This is a team exam with 70 questions. Each correct answer is worth one point.
* Write your answers on the sheet provided. There is one answer sheet for your team.
* Do not open the exam until instructed to do so.
* You may not use a calculator.
* Please put away your cell phones. You may not use your cell phone during the exam.
* There is no penalty for incorrect answers.
* You have 50 minutes to complete this exam.

1. What is equal to?

 A. B. C. D.

2. Find the second derivative with respect to , if *.*

 A.

 B.

 C.

 D.

3.



Given that the two triangles above are similar, what is the value of T?

 A. B. C. D.

4.



Given that the two horizontal lines are parallel to each other, and that the lines with the arrow heads are parallel to each other, what is the angle value of E?

 A. B. C. D.

5.



Given that the line segment M is the radius of the circle and has a slope of , what would the equation of the tangent line be if its -intercept is ?

 A. B. C. D.

6.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  | *2* | *5* | *8* |
|  | *4* | *7* | *1* |
|  | *-2* | *-3* | *9* |
|  | *0* | *0* | *-1* |

Using the table above, find the value of in terms of another function.

 A. B. C. D.

7. An urn contains two blue balls and three orange balls. Two balls are drawn at random and without replacement. Given that at least one of the balls is blue, what is the probability that both balls are blue?

 A. B. C. D.

8. Find the negative value of x satisfiying this equation: .

 A. B. C. D.

9. In how many ways can 5 different mathematics books be placed next to each other on a shelf?

 A. B. C. D.

10. Find all solutions of in the inverval of the equation .

 A. B. C. D.

11. Differentiate with respect to .

 A.

 B.

 C.

 D.

12. What is the antiderivative of ?

 A.

 B.

 C. Both A and B

 D. None of the above

13. A bag contains 20 marbles: 8 of the marbles are black, 3 of the marbles are blue, 2 of the marbles are red, and the rest are pink. You are given the following 2 quantities:

Quantity X: The Probability of consecutively choosing 3 black marbles without replacement.

Quantity Y: The probability of consecutively choosing 2 pink marbles and then 1 blue marble with replacement.

Which of the following statements is correct?

 A. Quantity X is greater.

 B. Quantity Y is greater.

 C.Both quantities are equal.

 D. Not enough information provided.

14.



In the figure above, is a rectangle with miles and miles. miles. Find the area, in square miles, of the quadrilateral in terms of .

 A.

 B.

 C.

 D.

15.



In figure above, is a secant and segment is tangent to the circle. . . Find the length of .

 A. B. C. D.

16. Which of the following is equal to ?

 A. B. C. D.

17. Find the derivative of

 A.

 B.

 C.

 D.

18.



In the figure above, a circle is inscribed in a square, which is inscribed in a bigger circle. The diameter of the bigger circle is 5. What is the area of the shaded part?

 A. B. C. D.

19. A game involving a fair die has the following rules. If an even number is rolled, the participant is awarded points worth 5 times the number on the die. If an odd number is rolled, points worth 10 times the number on the die are deducted.

What is the probability that the participant has 0 points after the die is rolled twice?

 A. B. C. D.

20. There are 250 freshmen at Owl University. 173 are taking Calculus II, 87 are taking English I and 111 are taking Physics I. 45 are taking both Calculus II and Physics I; 54 are taking both English I and Physics I; and 50 are taking both Calculus II and English I. 20 freshmen are taking all three subjects. How many freshmen are taking none of these three subjects?

 A. B. C. D. None of the above