Fox School of Business
TEMPLE UNIVERSITY®

2022 *OWLympiad* Sample Questions

Rules:

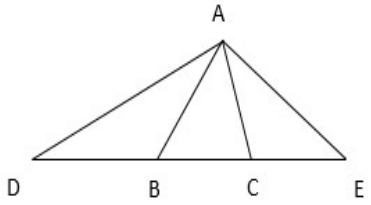
- This is a team exam.
- It is a multiple-choice exam.
- Teams will have 50 minutes to complete the exam.
- No calculators may be used

1. Find the derivative of $f(x) = 10\sqrt[5]{x^3} - \sqrt{x^7} + 6\sqrt[3]{x^8} - 3$, with respect to x.

   A. $6x^{\frac{2}{5}} - \frac{7}{2}x^{\frac{5}{2}} + 16x^{\frac{3}{5}}$
   B. $10x^{\frac{3}{5}} - x^{\frac{7}{2}} + 6x^{\frac{8}{3}} - 3$
   C. $6x^{-\frac{2}{5}} - \frac{7}{2}x^{\frac{5}{2}} + 16x^{\frac{5}{3}}$
   D. $6x^{\frac{2}{5}} - \frac{7}{2}x^{-\frac{5}{2}} + 16x^{\frac{5}{3}}$

2. In ΔABC, ∠ABC $= 50°$, ∠ACB $= 80°$. AB = BD, AC = CE. Find ∠DAE.

   A. $100°$
   B. $105°$
   C. $115°$
   D. $130°$



3. Vandana is giving the weather report. She predicts that there is a 44% chance it will rain on both Monday and Tuesday. Given that it rains on Monday, there is a 72% chance it will rain on Tuesday. What is the probability that it will rain on Monday?

   A. $\frac{1}{6}$
   B. $\frac{7}{8}$
   C. $\frac{11}{18}$
   D. $\frac{13}{18}$

4. Given $\begin{bmatrix} 0 & 3 & 0 \\ 4 & 7 & 5 \\ 12 & 21 & 15 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 8 \\ 11 \\ 33 \end{bmatrix}$, solve for x, y and z.

   A. x = 0, y = 7, z = 15
   B. x = 8, y = 11, z = 23
   C. No solution
   D. More than one solution

5. Given that $a + b = 5$ and $ab = 2$, find the exact value of $a^3 + b^3$.

   A. 90 B. 95 C. 100 D. 105

6. A theatre manager is trying to decide which movie genres are best for his theatre, so he looks at the sales data from the past year.

   49% saw comedy,
   64% saw drama,
   43% saw horror,
   24% saw both drama and horror,
   26% saw both drama and comedy,
   13% saw both comedy and horror, and
   7% saw all three.

   What percentage saw drama exclusively?

   A. 7
   B. 13
   C. 17
   D. 21

7. Simplify: $2\ln(y) + \frac{\ln x \log_x x}{\ln e - \ln 1}$.

   A. $\ln(xy^2)$
   B. $\ln(y^2 + x)$
   C. $\ln(y^2) + \log_x x$
   D. $\ln(2y + x)$

8. $\frac{\sin x}{1-\sin x} - \frac{\sin x}{1+\sin x}$ can also be written as:

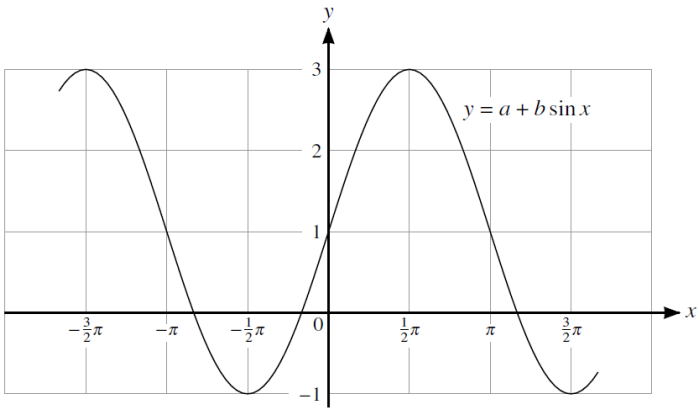
   A. $\frac{2\sin x}{1+\sin x}$ B. $\frac{2\sin x}{1-\sin x}$ C. $-2\tan x$ D. $2\tan^2 x$

9. Find the line perpendicular to $7x + 11y = 25$ that goes through the point (2, 1).

   A. $y = \frac{11}{7}x + \frac{15}{7}$
   B. $y = \frac{7}{11}x - \frac{7}{15}$
   C. $y = -\frac{11}{7}x + \frac{15}{7}$
   D. $y = \frac{11}{7}x - \frac{15}{7}$

10. (i) From the diagram below, what are the values of a and b?

(ii) What is the period of the graph of $y = a + b\sin(2x)$, where $a = 0$ and $b = 3$? In what interval does it lie?



A. $a = 1$ $b = 2$ period: 2π [-3,3]

B. $a = -1$ $b = 3$ period: 2π [-2,2]

C. $a = -1$ $b = 3$ period: π [-2,2]

D. $a = 1$ $b = 2$ period: π [-3,3]

11. Which of the following describes the relationship between *x* and *y* as shown in the pairs of numbers in the table below?

x	y
3	28
4	65
5	126
6	217
7	344

A. $y = 9x + 1$ B. $y = x^2 + x^2$ C. $y = x^4 + x^{-1}$ D. $y = x^3 + 1$

12.

X	10	20	25	30	40	45
Y	5	15	20	25	35	40

According to the table above, what's the relationship between the mean of X and the mean of Y? What about variance?

A. mean(X)>mean(Y); variance(X)>variance(Y).

B. mean(X)=mean(Y); variance(X)>variance(Y).

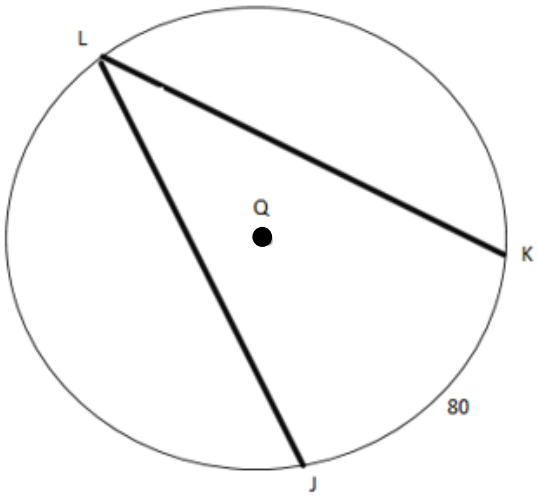
C. mean(X)=mean(Y); variance(X)=variance(Y).

D. mean(X)>mean(Y); variance(X)=variance(Y).

13. If the product of 6 integers is negative, at most, how many of the integers can be negative?

A. 2 B. 3 C. 4 D. 5

14. In circle Q, find the measure of inscribed <JLK



All arcs and angles are in degrees

A. 20 B. 40 C. 60 D. 80

15. Find the domain for $f(x) = \sqrt{\frac{x^2-5x}{x^2-9}}$

A. (∞,3) U (0,3) U [5,∞)
B. (∞,-3) U [0,3) U (5, ∞)
C. (-∞,-3) U [0,3) U [5,∞)
D. (-∞,-3) U [0,3) U (5,∞)