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Total (200)
Some useful formulas

To be filled
Multiple choice questions

(1) Let \( b = \langle 1, 0, 4 \rangle \), \( a = \langle 2, 0, -1 \rangle \). Find \( \text{proj}_a b \).

(A) 
(B) 
(C) 
(D) 

(2) Find \( \langle 2, 3, 1 \rangle \times \langle 1, 0, 5 \rangle \)

(A) 
(B) 
(C) 
(D) 

(3) Find the sum of the series

\[
\sum_{n=1}^{\infty} \frac{(-1)^n \pi^n}{3^{2n}(2n)!}.
\]

(A) 
(B) 
(C) 
(D) 

(4) Find the distance from the point \( P(1, 3, 2) \) to the plane \( 2x + 3y - 4z = 1 \).

(A) 
(B) 
(C) 
(D)
(5) Find the Maclaurin series for the function

\[ f(x) = \ln(4 - x). \]

Determine the interval of convergence.

(6) Find the sum of the series

\[ \sum_{n=1}^{\infty} \frac{(-1)^n}{n^6}, \]

within two decimals. Justify your answer.
(7) Find the area inside $r = 3 \cos(\theta)$, which is outside $r = 1 + \cos(\theta)$.
   **Remark:** Here you will normally be supplied with a picture.

(8) Find the length of the curve $r = \theta^2$, $0 \leq \theta \leq 2\pi$. 
(9) A woman walks west on the deck of a ship at 3 mph. The ship is moving north at 22 mph. Find the speed and the direction of the woman.

(10) Find the angle between the planes $2z = 4y - x$ and $3x - 12y + 6z = 1$. 
(11) Find the line of intersection of the planes \(x + y + z = 2, \ x - y + z = 3\).

(12) Find the equation of the plane that passes through the point \(P(1, 5, 1)\) and is perpendicular to the planes \(2x + y - 2z = 2, \ x + 3z = 4\).