

1. If $\cos x_2 = 3/5$ and $\cos x_1 = 5/13$, find $\cos(x_2 - x_1)$ if x_1 is a Quadrant I angle and x_2 is a Quadrant IV angle.
2. Find the area of a square inscribed in the circle described by $x^2 + y^2 - 10x - 16y + 62 = 0$.
3. How many positive integral factors does $16!$ have?
4. Find the sum of all x such that $\sin x + \cos x = 1$ and $0 \leq x < 4\pi$.
5. If $A = \begin{bmatrix} -1 & 1 & 1 \\ 2 & 1 & -1 \\ 1 & 3 & 2 \end{bmatrix}$, find the determinant of A^{-1} , where A^{-1} denotes the multiplicative inverse of matrix A .
6. A is the remainder when $2x^{101} - 3x^{99} + 2x^{97} - 3x + 2$ is divided by $(x+1)$.
 B is the value of $32x^5 - 80x^4y + 80x^3y^2 - 40x^2y^3 + 10xy^4 - y^5$ when $x = y = -1/2$.
 C is the maximum number of negative real roots of $2x^5 - 4x^3 + x^2 - 2 = 0$.
 Find the value of $\frac{1}{ABC}$.
7. Express as a fraction in lowest terms: $.3\overline{21} - .4\overline{5}$
8. If P is in the interior of a rectangle $ABCD$ such that $PA = 4$, $PB = 3$, and $PC = 6$, find PD .
9. A cylindrical tank with a 6 foot radius lies on its side parallel to and against the side of a warehouse. A ladder, leaning against the building, passes over and just touches the tank and has a slope of $-3/4$. Find the length of the ladder.
10. Evaluate: $\sum_{k=1}^{10} \frac{k^3 - k^2 - k}{47}$
11. A = the probability of guessing all answers correctly on a true false test with 5 questions.
 B = the probability of drawing two consecutive jacks, without replacement, from a standard 52-card deck.
 C = the probability of getting exactly one head when tossing 4 fair coins.
 D = the probability of drawing, without replacement, a queen and a jack when drawing two cards from a standard 52-card deck.
 Evaluate: $\frac{AB}{CD}$
12. Simplify and express in rectangular form:

$$\frac{(2 \text{ cis } 15^\circ)^3 (1 + i)^{-3}}{(1 - i\sqrt{3})^5}$$
13. What values of k will make the given lines perpendicular?

$$\begin{aligned} k^2x + 2ky &= 6 \\ 4x - k^3y &= 8 \end{aligned}$$
14. A circle whose radius is 2 is inscribed in an isosceles trapezoid whose longer base is 10. Find the length of the shorter base.
15. Find the area of a triangle whose vertices are $(-1,2), (3,6), (0,-4)$.