

ALGEBRA TEST
SOLUTIONS

TEAM

2007

Developed by:
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1) Solve the equation $2x^3 - 7x^2 - 10x + 24 = 0$

ANSWER: $\left(-2, \frac{3}{2}, 4\right)$

2) Two numbers are chosen, such that:

A. Their sum is no greater than 9

B. Three times the first minus the second is at least 7

C. Three times the second minus the first is at least 3

What is the maximum product of the numbers?

ANSWER: 20

3) Solve the equation $\sqrt{4x-2} + \sqrt{1-x} - \sqrt{3x} = 0$

ANSWER: $x = \frac{3}{4}$

4) Find the product of all the x -values in the solution to the complex, nonlinear system:

$$\begin{aligned}x^2 - y^2 &= 3 \\xy &= 2\end{aligned}$$

ANSWER: -4

5) Find the sum of all the roots of the equation: $(x^2 - 6x)^2 + 13(x^2 - 6x) + 40 = 0$

ANSWER: 12

6) What value of a would make the following system inconsistent?

$$3x + ay + 2z = 23$$

$$5x - 3y + 4z = 37$$

$$2x + z = -19$$

ANSWER: $a = -1$

7) A brother and sister inherit \$15,000 each. The sister invests \$10,000 in an account which yields 7.5% interest, compounded quarterly, and \$5000 in an account which yields 6.75% interest compounded continuously; the brother invests \$8,000 in an account which yields 7.25% interest, compounded monthly, and \$7000 in an account which yields 6.75% interest compounded continuously. After 15 years, how much more interest will the sister have received?

ANSWER: \$1320.78

8) Let $f(x) = \frac{3}{x-1}$ and $g(x) = \sqrt[3]{x+5}$:

A. $(g \circ f)\left(\frac{1}{2}\right)$

B. $(f^{-1} + g)(3)$

C. $(f \cdot g^{-1})(3)$

Find $A - 8B + C$

ANSWER: 0

9) Find and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$ for $f(x) = \frac{1}{x+1}$

ANSWER: $\frac{-1}{(x+1)(x+h+1)}$

10) The points $(-3,2)$ and $(5,8)$ lie at opposite ends of a diameter of a circle. Find the equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$.

ANSWER: $x^2 + y^2 - 2x - 10y + 1 = 0$

11) Find the quotient and remainder when $3x^5 + 2x^4 - 3x^2 + x - 5$ is divided by $x^2 + 2$

ANSWER: Quotient $3x^3 + 2x^2 - 6x - 7$
 Remainder $13x + 9$

12) y is inversely proportional to the square of x . If y is 3 when x is 2, find y when x is 6.

ANSWER: $\frac{1}{3}$

13) Jim is $\frac{2}{3}$ as old as his sister. Twenty years from now he will be $\frac{7}{8}$ as old. How old is Jim NOW?

ANSWER: 8 years old

14) Solve the system:

$$\begin{aligned} 2w + 3x - y + 2z &= 2 \\ 3w - x + y - 4z &= 0 \\ w + x + y - z &= 3 \\ 4w - 2x - 3y + 3z &= 4 \end{aligned}$$

ANSWER: $(2, -1, 5, 3)$