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Work Sheet For Grade 11

1. Given that $(3 - 2i)(x + 5i) = y + 11i$. Where x and y are real numbers:
   a) find two equations for x and y;
   b) find the values of x and y.
2. It is given that $z = x + iy$ and that z^* is the complex conjugate of z.
   a) Express $z + 2z^*$ in the form $p + qi$.
   b) Find the value of z for which $z + 2z^* = 9 + 2i$.
3. It is given that $z = x + iy$, where x and y are real numbers.
   a) Write down, in terms of x and y, an expression for z^*, the complex conjugate of z.
   b) Find, in terms of x and y, the real and imaginary parts of $2z - iz^*$
   c) Find the complex number z such that $2z - iz^* = 3i$.
4. Let A, B & C be matrices define as follows:

$$A = \begin{vmatrix} 4 & -2 & 5 \\ 1 & 0 & 3 \end{vmatrix} \qquad B = \begin{vmatrix} 1 & 3 & -2 \\ 2 & -4 & 1 \\ 0 & 1 & 1 \end{vmatrix} \qquad C = \begin{vmatrix} 1 & 3 \\ 2 & -1 \end{vmatrix}$$

Determine the following, if they exist.

a) $a_{11} =$ _____
b) $b_{23} =$ _____
c) $c_{21} =$ _____
d) $2A - A =$ _____
e) $C^2 =$ _____

5. If $A = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$, $B = \begin{pmatrix} a & 1 \\ b & -1 \end{pmatrix}$ and $(A + B)^2 = A^2 + B^2$, then find a *and* b.

6. If $f(x) = x^2 - 5x$ and $A = \begin{pmatrix} 1 & -2 \\ 2 & -1 \end{pmatrix}$, then find $f(A)$.

7. Let $A = \begin{pmatrix} 3 & 4 \\ 4 & 6 \end{pmatrix}$, $B = \begin{pmatrix} -2 & 3 & 5 \\ 3 & -1 & 4 \\ 5 & 4 & 8 \end{pmatrix}$, then show that

   a) $A^t = A$

   b) $B^t = B$

8. Let $A = \begin{bmatrix} 0 & 4 & -6 \\ -4 & 0 & 2 \\ 6 & -2 & 0 \end{bmatrix}$ then show that A is skew symmetric.

9. Let $S = \{1,2,4,5,6,7,9\}$ and suppose a 4-digit number is formed by selecting digits, without replacement for S.
   a) How many different such numbers can be formed?
   b) How many different such numbers can be formed if both even & odd digits must be used?

10. A club has 8-girls & 6-boys. A basket ball team of 5-members is to be selected.
   a) In how many ways can the selection be made?
   b) In how many ways can the selection be made both so that team contains both boys & girls?

11. Consider the binomial expansion$(2a + b)^5$.
   a) The first two terms of the expansion
   b) The last two terms of the expansion
   c) The third & fourth terms of the expansion
   d) The coefficient of a^5 is the expansion

12. A bag contains seven black & five white balls. Four balls are drawn at random. What is the probability that
   a) all of them are black?
   b) two of them are black & two are white?

13. 20000 birr is invested in a business that pay 10% interest compounded annually.

    Find the amount at the end of

    a) 3 years

    b) 5 years

14. A car purchases for 30000 birr depreciates at the rate of 5% per annum, the depreciating being worked out on the value of the car at the begging of the year. Find its depreciated value after 10 years.

15. Helen deposit birr 2000 at 8% interest compounded annually. How many years will it take her to get birr 3000?

16. A 2300 birr is invested at 12% interest compounded annually. How much will you have in your account at the end of 10 year?