



I. Write TRUE if the statement is always true, otherwise, write FALSE. 1 point each

1. The domain and range of polynomial functions is \mathbb{R} .
2. The real part of the multiplicative inverse of $3 - 2i$ is $\frac{1}{3}$.
3. The set of irrational numbers is closed under addition.
4. If $A \subseteq B$ and $C \subseteq B$, then $A \subseteq C$.
5. If $a \in \mathbb{R}$, then $\frac{1}{\left(\frac{1}{a}\right)} = a$.

II. Fill in the blanks.

1. Let O be the set of positive odd integers and P the set of prime numbers. _____ are the first five elements of $O \setminus P$. 1 point
2. If $A \subset B$ and $B \subset C$ and if A contains 2 elements, B contains 4 elements and C contains 6 elements, then $\phi(A \cup B \cup C)$ has _____ elements. 2 points
3. The quotient when
4. In completely factored form, $4x^2 - y^2 - 12x + 10y - 16 =$ _____. 3 points
5. The factors of $3a^4 + 3a^2b^2 + 3y^4$ are _____. 3 points
6. In simplified form, $9\sqrt{27p^2} - 4p\sqrt{108} - 2\sqrt{48p^2} =$ _____. 3 points
7. The imaginary part of the conjugate of $2i^{27} + i^{38}$ is _____. 3 points

III. Do as indicated.

4 points each

1. Simplify: $\left(\frac{(2y)^{-3} + x^{-3}}{(2y)^{-2} - x^{-2}} \div \frac{x^2 - 2xy + 4y^2}{x^4y + xy^4} \right) \cdot \left(\frac{1}{x^2 - y^2} - \frac{1}{x^2 - xy + y^2} \right)$.

2. Simplify: $\frac{x - 2 + \frac{x - 2}{x + 2}}{x + \frac{3x + 12}{x + 2}}$.

3. Simplify: $\left(\frac{\sqrt{x} + 1}{\sqrt{x} - 1} - \frac{\sqrt{x} - 1}{\sqrt{x} + 1} \right) \cdot \left(\frac{x}{x - 1} \right)^{-1}$.

4. Express in the form $a + bi$: $\frac{\sqrt{-1} + 2}{\sqrt{2} - \sqrt{-4}}$.