Complex Numbers + − × ÷

a + bi, a is the real part and b is the imaginary part

Simplify

adding like parts

1. $(4+2i)+(3-6i)$ $= 7-4i$

2. $(5+2i)-(7-3i)$

$5+2i-7+3i = -2+5i$

$i^2 = -1$ write $a+bi$

Simplify

3. $3i(3+5i)$ $= 9i+15i^2$ (-1)

$9i-15 = -15+9i$

4. $(6+2i)(5-7i)$ $= 30-42i+10i-14i^2$ (-1)

$= 30-32i+14 = 44-32i$

5. $(3-5i)(3+5i)$

Conjugates $(a+bi)(a-bi)$

$= 9+15i-15i-25i^2$ (-1)

$= 9+25 = 34$

Simplify

multiply by $\frac{\text{conj}}{\text{conj}} = 1$ of denominator

6. $\frac{3}{1+i}\left(\frac{1-i}{1-i}\right) = \frac{3-3i}{1-i^2} = \frac{3-3i}{1+1} = \frac{3-3i}{2}$

$= \frac{3}{2} - \frac{3}{2}i$

7. $\frac{3i}{5-4i}\left(\frac{5+4i}{5+4i}\right) = \frac{15i+12i^2}{25-16i^2} = \frac{15i-12}{25+16}$

$= \frac{-12+15i}{41}$

$= \boxed{\frac{-12}{41} + \frac{15}{41}i}$

11. $\frac{2+i}{2-i}\left(\frac{2+i}{2+i}\right) = \frac{4+2i+2i+i^2}{4-i^2}$

$= \frac{4+4i-1}{4+1}$

$= \frac{3+4i}{5} = \boxed{\frac{3}{5} + \frac{4}{5}i}$