1.3 Complex Conjugates

$(a+bi)(a-bi) = a^2+b^2$ Complex Conjugate

$(x+y)(x-y) = x^2-y^2$ diff. squares

ex 6 Dividing Complex Numbers

(a) $\left(\frac{3+2i}{5-i}\right)\left(\frac{5+i}{5+i}\right) = \frac{15+3i+10i-1(2)}{25+5i-5i-i^2}$ (i^2)

$= \frac{15-2+13i}{25-i^2} = \frac{13+13i}{25-(-1)} = \frac{13+13i}{25+1}$

$= \frac{13+13i}{26} = \frac{13}{26} + \frac{13i}{26} = \boxed{\frac{1}{2}+\frac{1}{2}i}$

(b) $\frac{3}{i}\left(\frac{-i}{-i}\right) = \frac{-3i}{-i^2} = \frac{-3i}{-(-1)} = \frac{-3i}{1} = \boxed{-3i}$

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Powers of i can be simplified

$i^1 = i$

$i^2 = -1$

$i^3 = i(i^2) = -i$

$i^4 = i^2 i^2 = (-1)(-1) = 1$

$i^5 = i\,i^4 = 1i = i$

$i^6 = i^2 i^4 = -1(1) = -1$

$i^7 = i^3 i^4 = -i(1) = -i$

$i^8 = i^4 i^4 = (1)(1) = 1$

6.3

		Remainder
$i^1 =$	i	.25
$i^2 =$	-1	.5
$i^3 =$	$-i$	.75
$i^4 =$	1	0

$i^{80} = 1$ $\qquad$ $i^{79} = -i$

$\frac{79}{4} \rightarrow .79$

E7 (a) i^{15} $\qquad$ $\frac{15}{4} = 3.75$

$i^{15} = \boxed{-i}$

$i^{15} = i^4 i^4 i^4 i^3 = i^2 i = (-1)i = \boxed{-i}$

(b) $i^{-3} \cdot i^4 = i^{-3+4} = i^1 = \boxed{i}$

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(c) $\frac{1}{i^{13}} = i^{13} = (i^2)^6 i = i$