Even answers p. 276

#20 $\frac{2}{29} - \frac{5}{29}i$

#22 $\frac{a-bi}{a^2+b^2}$

#24 $x = \frac{16}{3}, y = \frac{-19}{8}$

#26 sum: 2
product: 3

#28 sum: $\frac{3}{2}$
product: $\frac{3}{2}$

#6 $\pm \frac{\sqrt{2}}{2}i$

#8 $\pm \frac{\sqrt{15}}{5}i$

#10 $\frac{1}{6} \pm \frac{\sqrt{35}}{6}i$

#12 $1 \pm i$

#14 $\frac{3}{2} + \frac{1}{2}i$

#18 (a) $c < 9$
(b) $c > 9$
(c) $c = 9$

#8 $-5x^2 - 3 = 0$

$-5x^2 = 3$

$x^2 = -\frac{3}{5}$

$x = \pm\sqrt{-\frac{3}{5}}$

$= \pm i\sqrt{\frac{3}{5}}$

$= \pm i \cdot \frac{\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$= \pm i \frac{\sqrt{15}}{5} = \pm \frac{\sqrt{15}}{5}i$

#9 $x^2+2x+3=0$

$a=1 \quad b=2 \quad c=3$

$$x=\frac{-2\pm\sqrt{4-12}}{2}$$

$$=\frac{-2\pm\sqrt{-8}}{2}$$

$$=\frac{-2\pm 2i\sqrt{2}}{2}$$

$$=\frac{2(-1\pm i\sqrt{2})}{2}=-1\pm i\sqrt{2}$$

#14 $2x(x-3)=-5$

$2x^2-6x=-5$

$2x^2-6x+5=0$

$a=2 \quad b=-6 \quad c=5$

$$x=\frac{6\pm\sqrt{36-40}}{4}$$

$$=\frac{6\pm\sqrt{-4}}{4}=\frac{6\pm i\sqrt{4}}{4}$$

$-6^2=-36$

$(-6)^2=36$

$$=\frac{6\pm 2i}{4}=\frac{2(3\pm i)}{2(2)}=\frac{3}{2}\pm\frac{i}{2}$$

$$=\frac{3}{2}\pm\frac{1}{2}i$$

ok $\frac{1 \pm \sqrt{35}}{6}$ $\frac{1 \pm i\sqrt{35}}{6}$

$\rightarrow \frac{1}{6} \pm \frac{\sqrt{35}}{6} i$

#17 $(x+3i)(x-3i)=34$

$x^2+9=34$

$x^2=25$

$x=\pm 5$

$x=-5, x=5$

#18 $x^2 - 6x + c = 0$

$a = 1 \quad b = -6 \quad c = c$

discriminant: $b^2 - 4ac$

$= 36 - 4c$

i) 2 real

$36 - 4c > 0$

$36 > 4c$

$9 > c$

ii) 2 imag

$36 - 4c < 0$

$\vdots$

$c > 9$

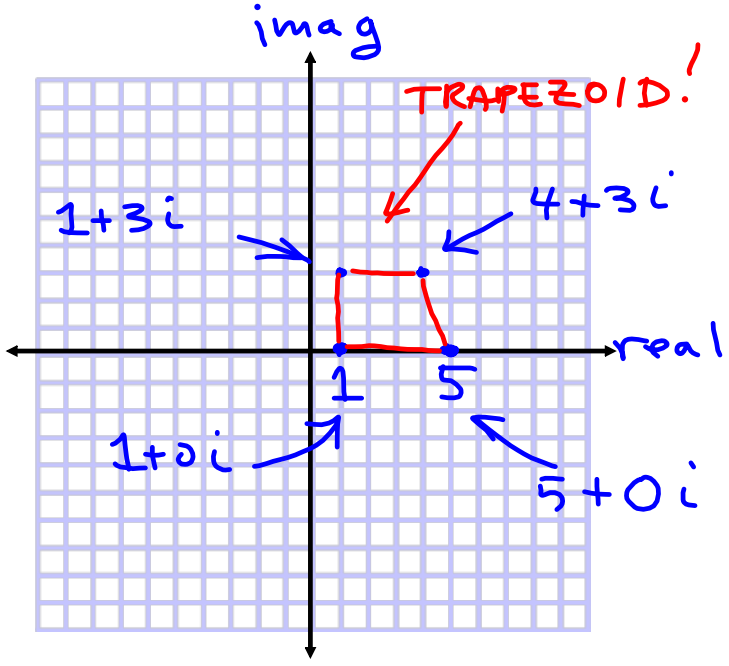
iii) 1 real

$36 = 4c$

$c = 9$

any $c < 9$

#19



#20 $\frac{1}{2+5i} \cdot \frac{2-5i}{2-5i}$ ← complex in denominator

$= \frac{2-5i}{4-10i+10i-25i^2}$

$= \frac{2-5i}{29} = \frac{2}{29} - \frac{5}{29}i$

#22 $\frac{1}{a+bi} \cdot \frac{a-bi}{a-bi}$

$= \frac{a-bi}{a^2+b^2}$

$= \frac{a}{a^2+b^2} - \frac{b}{a^2+b^2}i$

#24 $3x+19i = 16-8yi$

Real parts equal:

$3x = 16$

$x = \frac{16}{3}$

Imag. parts equal

$19i = -8yi$

$-8y = 19$

$y = \frac{19}{-8} = -\frac{19}{8}$

#27 $5x^2+2x+1 = 0$

$a=5 \quad b=2 \quad c=1$

$x = \frac{-2 \pm \sqrt{4-20}}{10} \qquad \sqrt{-16} \quad 4i$

$= \frac{-2 \pm 4i}{10} = \frac{2(-1 \pm 2i)}{2(5)}$

$= \frac{-1 \pm 2i}{5}$

$x_1 = -\frac{1}{5} + \frac{2}{5}i \qquad x_2 = -\frac{1}{5} - \frac{2}{5}i$

sum: $-\frac{1}{5} + \frac{2}{5}i - \frac{1}{5} - \frac{2}{5}i$

$= -\frac{2}{5}$

product: $\left(-\frac{1}{5} + \frac{2}{5}i\right)\left(-\frac{1}{5} - \frac{2}{5}i\right)$

$= \frac{1}{25} - \frac{4}{25}i + \frac{4}{25}$

$= \frac{5}{25} = \frac{1}{5}$

#28 $-2x^2+3x-3=0$

$a=-2 \quad b=3 \quad c=-3$

$$x=\frac{-3\pm\sqrt{9-24}}{-4}$$

$$=\frac{-3\pm i\sqrt{15}}{-4}$$

$$x=\frac{3}{4}\pm\frac{\sqrt{15}}{4}i$$

$$x=\frac{3}{4}\pm\frac{\sqrt{15}}{4}i$$

$$x_1=\frac{3}{4}+\frac{\sqrt{15}}{4}i$$

$$x_2=\frac{3}{4}-\frac{\sqrt{15}}{4}i$$

(a) $x_1+x_2=\frac{3}{4}+\frac{3}{4}=\frac{6}{4}=\frac{3}{2}$ sum

(b) $x_1\cdot x_2=\left(\frac{3}{4}+\frac{\sqrt{15}}{4}i\right)\left(\frac{3}{4}-\frac{\sqrt{15}}{4}i\right)$

$$=\frac{9}{16}-\frac{15}{16}i+\frac{15}{16}$$

$$=\frac{24}{16}=\frac{8(3)}{8(2)}=\frac{3}{2}$$