1.11 $\cancel{1}, \cancel{3}, \cancel{6}, \cancel{8}$

1.12 $\cancel{1}, \cancel{2}, \cancel{3}, \cancel{4}, \cancel{7}$

1) $\cancel{2\exp(i\,2\pi)}$ $\qquad \sqrt[n]{R_0}\,\exp\left[i\left(\frac{\theta_0}{n}+\frac{2k\pi}{n}\right)\right]$

a) $\sqrt{2}\exp\left(i\left(\frac{\pi}{4}+k\pi\right)\right), \rightarrow \sqrt{2}\exp\left(i\left(\frac{\pi}{4}+0\right)\right)$ & $\sqrt{2}\exp\left(i\left(\frac{\pi}{4}+\pi\right)\right)$

$$\sqrt{2}\exp\left(i\left(\frac{\pi}{4}+0\right)\right)=\sqrt{2}\left(\cos\left(\frac{\pi}{4}\right)+i\sin\left(\frac{\pi}{4}\right)\right)=1+i$$

$\pm(1+i)$ $\quad k=1$ moves to positive

b) $1-\sqrt{3}i$ $\qquad \sqrt[n]{4}\exp\left(i\left(\frac{-\frac{\pi}{3}}{n}+\frac{2k\pi}{n}\right)\right)$

$$\sqrt{2}\exp\left(i\left(\frac{-\pi}{6}+k\pi\right)\right)$$

$$\sqrt{2}\exp\left(i\left(\frac{-\pi}{6}+0\right)\right),\ 2\exp\left(i\left(\frac{-\pi}{6}+\pi\right)\right)$$

$$\pm\frac{\sqrt{3}-i}{\sqrt{2}}$$

3) $(-8-8\sqrt{3}i)^{1/4} = 16^{1/4}\exp\left(i\left[\frac{\pi}{3}\right]\right)$

$$2\exp\left[i\left(\frac{\pi}{12}+0\right)\right]$$

$n=0 \qquad 2\cos\left(\frac{4\pi}{12}\right)+2i\sin\left(\frac{4\pi}{12}\right)=\left(1+\sqrt{3}i\right)$

$n=1 \qquad 2\cos\left(\frac{4\pi}{12}+\frac{2\pi}{4}\right)+2i\sin\left(\frac{4\pi}{12}+\frac{2\pi}{4}\right)=\left(-\sqrt{3}+i\right)$

$n=2, n=3 \ldots$ yeilds $=\pm\left(1+\sqrt{3}i\right)$ & $\pm\left(\sqrt{3}-i\right)$

$$z_0 = (1+i)$$

b) $z_1 = \sqrt{2}\, e^{i\left(\frac{\pi}{4}+\frac{\pi}{2}\right)} = (-1+i)$

$z_2 = \sqrt{2}\, e^{i\left(\frac{\pi}{4}+\pi\right)} = (-1-i)$

$z_3 = \sqrt{2}\, e^{i\left(\frac{\pi}{4}+\frac{6\pi}{4}\right)} = (1-i)$

$$(z^2+2z+2)(z^2-2z+2)$$

8) $az^2+bz+c=0$

$$a\left(z+\frac{b}{2a}\right)^2+c-\frac{b^2}{4a}=0$$

$$\cancel{a\left(z^2+\frac{zb}{a}+\frac{b^2}{4a^2}\right)+c}=\frac{b^2}{4a}$$

$$\cancel{az^2+zb+\frac{b^2}{4a}+c=\frac{b^2}{4a}}$$

$$a\left(z+\frac{b}{2a}\right)^2+c=\frac{b^2}{4a}$$

$$\left(z+\frac{b}{2a}\right)^2=\frac{b^2}{4a^2}-\frac{c}{a}$$

$$z+\frac{b}{2a}=\frac{b^2}{2a}-\frac{\sqrt{c}}{\sqrt{a}}=\frac{b^2}{2a}-\frac{\sqrt{4ac}}{2a}=\frac{\sqrt{b^2-4ac}}{2a}$$

$$z=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$4-4-4i$

$+4i \quad \sqrt{+4i}$

b) $a=1,\ b=2\quad c=1-i$

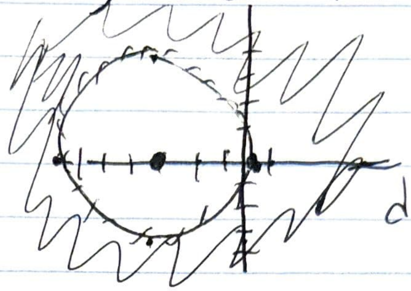
$$\frac{-2\pm\sqrt{4-4(1-i)}}{2}=\frac{-2\pm2\sqrt{i}}{2}$$

$$\left(-1+\frac{1}{\sqrt{2}}\right)+\frac{i}{\sqrt{2}}\qquad\left(-1-\frac{1}{\sqrt{2}}\right)-\frac{i}{\sqrt{2}}\qquad=-1+2\sqrt{i}$$

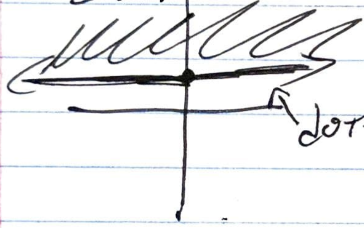
1.12

1) a) $|z-2+i| \le 1$

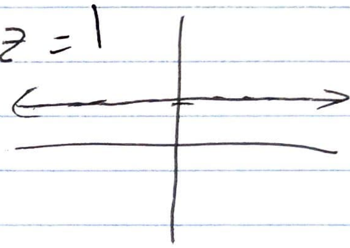
b) $|2z+3| > 4$



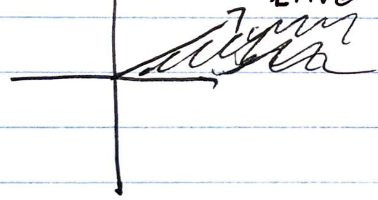
c) $\operatorname{Im} z > 1$



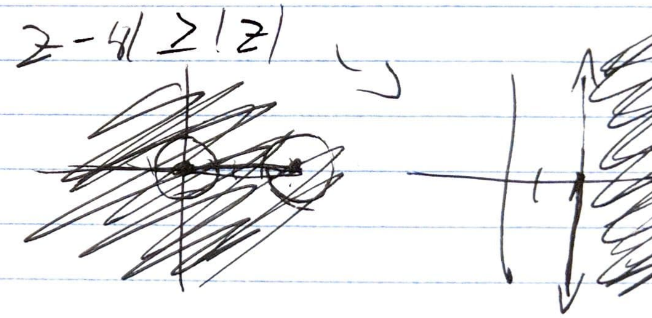
d) $\operatorname{Im} z = 1$



e)



f) $|z-4| \ge |z|$



b & c are domains

2) e, contains points on 2 sides, but goes to infinity.

3) a, fully bounded by function

$(x+yi)^2$

$x^2 - y^2 \geq 0$

$x^2 \geq y^2$

$x \geq y$

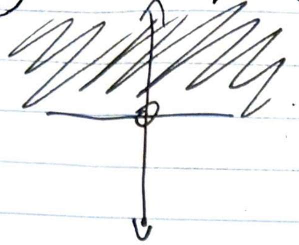
$x^2 < x^2+y^2$

$0 < y^2$

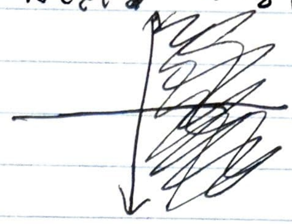
$\sqrt{x^2} < \sqrt{x^2+y^2}$

?

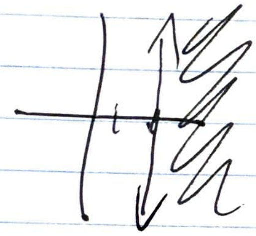
4) a) $-\pi < \arg z < \pi$



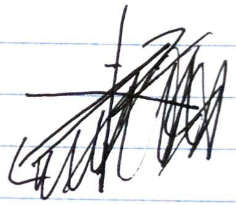
b) $|\mathrm{Re}\, z| < |z|$



c) $\mathrm{Re}\, \frac{1}{z} \leq \frac{1}{2} = \frac{1}{x} \leq \frac{1}{2} = 2 \leq x$



d) $\mathrm{Re}(z^2) \geq 0$



7) a) none, every other is real / imaginary

b) 0, as $n \to \infty$, $z_n \to 0$

c) 0, points accumulate to origin

d) $\pm(1+i)$