1.) $x^2 + 4x - 21 = 0$

$(x+7)(x-3) = 0$

$x = -7 \quad x = 3$

b) $x^2 = 1$

$x = \sqrt{1}$

$x = 1$ or -1

c) $2z^2 - z - 1 = 0$

$2z^2 - 2z + z - 1 = 0$

$2z(z+1) - 1(z+1) = 0$

$(2z-1)(z+1) = 0$

$z = -\frac{1}{2}$ or 1

d) $4s^2 - s - 2 = 0$

$x = \frac{1 \pm \sqrt{1+32}}{8}$

$x = \frac{-\sqrt{33}}{8}$ or $x = \frac{\sqrt{33}}{8}$

e) $x^2 + 1 = 0$

$x^2 = -1$

$x = \sqrt{-1}$

$x = i$

f) $-x^2 - 3x - 4 = 0$

$x^2 + 3x + 4 = 0$

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

$\frac{-3 \pm \sqrt{9 - 4 \times 1 \times 4}}{2} = \frac{-3 \pm \sqrt{-7}}{2}$

$= \frac{-3 \pm i\sqrt{7}}{2}$

$\left(x + \left[\frac{-3+i\sqrt{7}}{2}\right]\right)\left(x + \left[\frac{-3-i\sqrt{7}}{2}\right]\right) = 0$

2.) $x-2 \overline{)\,3x^3 - 11x^2 + 16x - 12}$

$3x^2 - 5x + 6$

$-(3x^3 - 6x^2)$

$0 - 5x^2 + 16x$

$-(-5x^2 + 10x)$

$0 + 6x - 12$

$-(6x - 12)$

$(x-2)(3x^2 - 5x + 6) = 0$

$\frac{5 \pm \sqrt{25 - 72}}{6} = \frac{5 \pm i\sqrt{47}}{6}$

$(x-2)\left(x + \left[\frac{5 + i\sqrt{47}}{6}\right]\right)\left(x + \left[\frac{5 - i\sqrt{47}}{6}\right]\right) = 0$

3.) $x^2 + 2x - 8 \leq 0$

$(x-2)(x+4) \leq 0$

$x \geq 2$ or $x \geq -4$

4.)

a.) $z = -11 - 8i$

$\bar{z} = -11 + 8i$

b.) $z = 5 + 3i$

$\bar{z} = 5 - 3i$

c.) $z = 0 + 2i$

$\bar{z} = 0 - 2i$

5.) $z_1 = 3 + 2i \quad z_2 = 4 - 8i$

a.) $z_1 + z_2 = 7 - 6i$

b.) $z_1 - z_2 = -1 + 10i$

c.) $z_2 - z_1 = 1 - 10i$

d.) $(3+2i)(4-8i) = 12 - 24i + 8i - 16i^2$

$= 12 - 16i + 16$

$= 28 - 16i$

e.) $\frac{z_1}{z_2} = \frac{3+2i}{4-8i}$

$\frac{3+2i}{4-8i} \times \frac{4+8i}{4+8i} = \frac{-4 + 32i}{80}$

$= \frac{-1}{20} + \frac{32i}{80}$

6.) a.) $\frac{5+3i}{2+2i} = \frac{5+3i}{2+2i} \times \frac{2-2i}{2-2i} = \frac{10+6i-10i-6i^2}{8}$

$= \frac{16}{8} - \frac{4i}{8} = \underline{2 - 0.5i}$

b.) $\frac{-2+3i}{0+i} = \frac{-2+3i}{i} \times \frac{-i}{-i} = \frac{-2i-3i^2}{-i^2} = \frac{3-2i}{1} = \underline{3-2i}$

c.) $(5+3i)(2-i)-(3+i) = (10+6i-5i-3i^2)-(3+i)$

$= (13+i)-(3+i) = \underline{10+0i}$

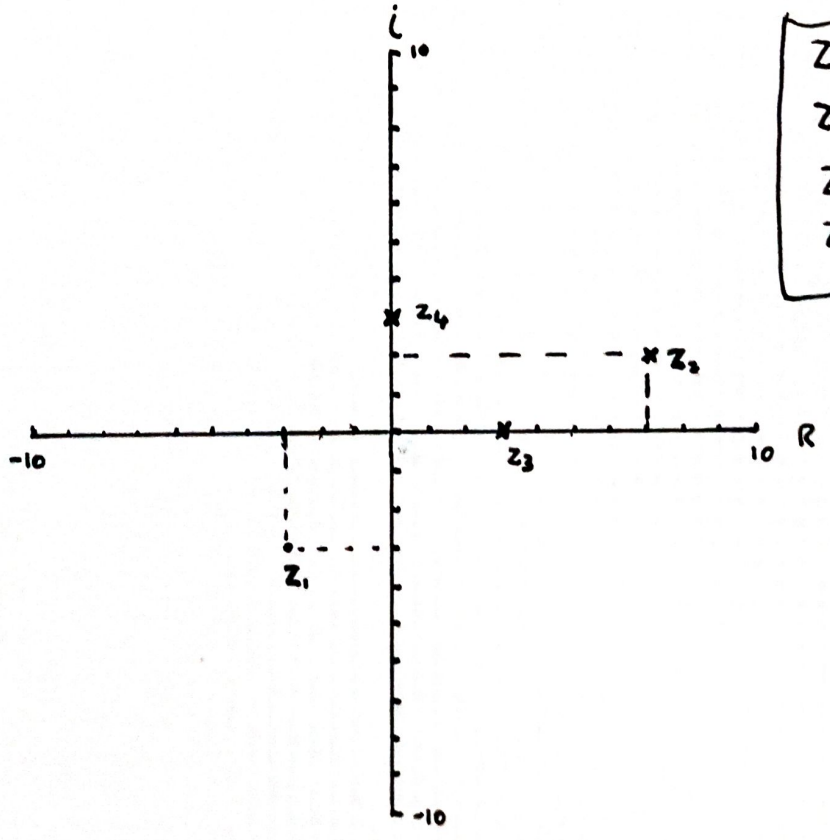
d.) $(1-2i)(1-2i) = \underline{-3-4i}$

e.) $\frac{5-8i}{3-4i} = \frac{5-8i}{3-4i} \times \frac{3+4i}{3+4i} = \frac{49-4i}{25} = \frac{49}{25} - \frac{4i}{25}$

f.) $\frac{3}{3+2i} + \frac{1}{5-i} = \left(\frac{3}{3+2i} \times \frac{3-2i}{3-2i}\right) + \left(\frac{1}{5-i} \times \frac{5+i}{5+i}\right)$

$= \frac{9-6i}{13} + \frac{5+i}{26} = \frac{23}{26} - \frac{11i}{26}$

7.)



$z_1 = -3-3i$

$z_2 = 7+2i$

$z_3 = 3+0i$

$z_4 = 3i$

8.) $2+x-yi = (1+2i)(3x+yi)$

$2+x-yi = 3x+yi+6ix+2yi^2$?

$2+x-yi = 3x+yi+6ix-2y$

$2-2x-6ix+2y=0$

9.) $(2+3i)+\dfrac{(3+4i)(-5+12i)}{(3+4i)+(-5+12i)} = (2+3i)+\dfrac{(-63+16i)}{(-2+16i)}$

$= (2+3i)+\left(\frac{191}{130}+\frac{246i}{65}\right) = \underline{\frac{451}{130}+\frac{439i}{65}}$

10.)