

Alg 2: Exam 6 Review Sheet

$$\begin{aligned}
 \textcircled{1} \quad & (1-\sqrt{-9})(2-\sqrt{-1}) \\
 & = (1-3i)(2-i) \\
 & = 2-i-6i+3i^2 \\
 & = 2-7i+3(-1) \\
 & = 2-7i-3 \\
 & = \boxed{-1-7i}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{2} \quad & 5i^{12} - 2i^{17} + 4i^{10} \\
 & = 5(1) - 2i + 4i^2 \\
 & = 5 - 2i + 4(-1) \\
 & = 5 - 2i - 4 \\
 & = \boxed{1-2i}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{3} \quad & 2\sqrt{-32} - 2\sqrt{-2} \\
 & = 2i\sqrt{32} - 2i\sqrt{2} \\
 & = 2i\sqrt{16}\sqrt{2} - 2i\sqrt{2} \\
 & = 2i(4)\sqrt{2} - 2i\sqrt{2} \\
 & = 8i\sqrt{2} - 2i\sqrt{2} \\
 & = 6i\sqrt{2} \\
 & = \boxed{0 + (6\sqrt{2})i}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{4} \quad & (4-3i)^2 \\
 & = (4-3i)(4-3i) \\
 & = 16 - 12i - 12i + 9i^2 \\
 & = 16 - 24i + 9(-1) \\
 & = \boxed{7-24i}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{5} \quad & (2i^4)^5 \\
 & = (2)^5 (i^4)^5 \\
 & = 32i^{20} \\
 & = 32(1) \\
 & = \boxed{32+0i}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{6} \quad & \frac{1}{2i} \cdot \frac{i}{i} = \frac{i}{2i^2} \\
 & = \frac{i}{2(-1)} = \frac{i}{-2} = \boxed{0 - \frac{1}{2}i}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{7} \quad & \frac{3i}{2-i} \cdot \frac{(2+i)}{(2+i)} \\
 & = \frac{3i(2+i)}{4-i^2} \\
 & = \frac{6i+3i^2}{4-(-1)} \\
 & = \frac{6i-3}{5} = \boxed{\frac{-3}{5} + \frac{6}{5}i}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{8} \quad & (\sqrt{-9})(2\sqrt{-4}) \\
 & = (3i)(2 \cdot 2i) \\
 & = (3i)(4i) \\
 & = 12i^2 \\
 & = 12(-1) = \boxed{-12}
 \end{aligned}$$

$$(9) \quad x^2 = 2x - 10$$

$$x^2 - 2x + 10 = 0$$

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

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(10)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4 - 40}}{2}$$

$$x = \frac{2 \pm \sqrt{-36}}{2}$$

$$x = \frac{2 \pm 6i}{2}$$

$$x = \boxed{1 \pm 3i}$$

$$(10) \quad 2x^2 - 8x + c = 0$$

$$\text{sum} = \frac{-b}{a} = \frac{8}{2} = 4$$

$$r_1 + r_2 = 4$$

$$-1 + r_2 = 4$$

$$\boxed{r_2 = 5}$$

$$\text{prod} = \frac{c}{a}$$

$$r_1 r_2 = \frac{c}{a}$$

$$(-1)(5) = \frac{c}{2}$$

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

$$\boxed{-10 = c}$$

$$(11) \quad \text{roots} = 3 \pm i$$

$$\text{sum} = (3+i) + (3-i) = 6$$

$$\text{prod} = (3+i)(3-i) = 9 - i^2 = 9 - (-1) = 10$$

$$x^2 - (\text{sum})x + (\text{prod}) = 0$$

$$\boxed{x^2 - 6x + 10 = 0}$$

$$(12) \quad \frac{x}{\sqrt{x+4}}$$

$$x+4 > 0$$

$$\boxed{x > -4} \quad \text{choice (3)}$$

(13) $kx^2 + 2x + 1 = 0$ imag roots

$$b^2 - 4ac < 0$$

$$(2)^2 - 4(k)(1) < 0$$

$$4 - 4k < 0$$

$$\frac{4}{4} < \frac{4k}{4}$$

$$1 < k$$

$$k > 1$$

↓

$$k \text{ could be } \boxed{2}$$

choice (2)

(14) roots = -2 and $\frac{3}{2}$

$$\text{sum} = -2 + \frac{3}{2}$$

$$= -\frac{4}{2} + \frac{3}{2} = -\frac{1}{2}$$

$$\text{prod} = (-2)\left(\frac{3}{2}\right)$$

$$= \left(\frac{-2}{1}\right)\left(\frac{3}{2}\right) = -3$$

$$x^2 - \left(-\frac{1}{2}\right)x + (-3) = 0$$

$$x^2 + \frac{1}{2}x - 3 = 0$$

$$2(x^2 + \frac{1}{2}x - 3) = 2(0)$$

$$\boxed{2x^2 + x - 6 = 0}$$

(15) a) additive inverse of $-3+2i = \boxed{3-2i}$

b) conjugate of $-3+2i = \boxed{-3-2i}$

c) mult. inverse of $-3+2i = \frac{1}{-3+2i}$

$$\frac{1}{(-3+2i)} \cdot \frac{(-3-2i)}{(-3-2i)} = \frac{-3-2i}{9-4i^2}$$

$$= \frac{-3-2i}{9-4(-1)} = \frac{-3-2i}{13}$$

$$= \frac{-3-2i}{9+4}$$

$$= \boxed{-\frac{3}{13} - \frac{2}{13}i}$$

⑩ one root = $9-2i$
other root = $9+2i$

$$x^2 - 18x + 85 = 0$$

$$\begin{aligned} \text{sum} &= 9-2i + 9+2i = 18 \\ \text{prod} &= (9-2i)(9+2i) = 81 - 4i^2 \\ &= 81 - 4(-1) \\ &= 81 + 4 = 85 \end{aligned}$$

⑪ $9x^2 = 7x + 2$ $a = 9$
 $9x^2 - 7x - 2 = 0$ $b = -7$
 $c = -2$

$$\text{sum} = -\frac{b}{a} = -\frac{-7}{9} = \boxed{\frac{7}{9}}$$

$$\text{prod} = \frac{c}{a} = \boxed{\frac{-2}{9}}$$

⑫ $nx^2 - 7x + 2 = 0$

equal roots
↓

$$(-7)^2 - 4(n)(2) = 0$$

$$b^2 - 4ac = 0$$

$$49 - 8n = 0$$

$$8n = 49$$

$$\boxed{n = \frac{49}{8}}$$

19) a) $y = -x^2 + x - 1$ Since $a < 0$, parabola opens downward.


$$b^2 - 4ac \quad a = -1$$

$$= (1)^2 - 4(-1)(-1) \quad b = 1$$

$$= 1 - 4 \quad c = -1$$

$$= -3 \Rightarrow \text{no real roots}$$

(4) below x-axis



b) $y = 3x^2 - 4x - 3$ $a = 3$

$$b^2 - 4ac \quad b = -4$$

$$= (-4)^2 - 4(3)(-3) \quad c = -3$$

$$= 16 + 36$$

$$= 52 \Rightarrow \text{positive, not perf square}$$

$$\Rightarrow 2 \text{ x-intercepts}$$

(2) intersects @ 2 pts

c) $y = 9x^2 - 6x + 1$ $a = 9$

$$b^2 - 4ac \quad b = -6$$

$$= (-6)^2 - 4(9)(1) \quad c = 1$$

$$= 36 - 36$$

$$= 0 \Rightarrow \text{equal roots}$$

$$\Rightarrow \text{parabola is tangent to x-axis}$$

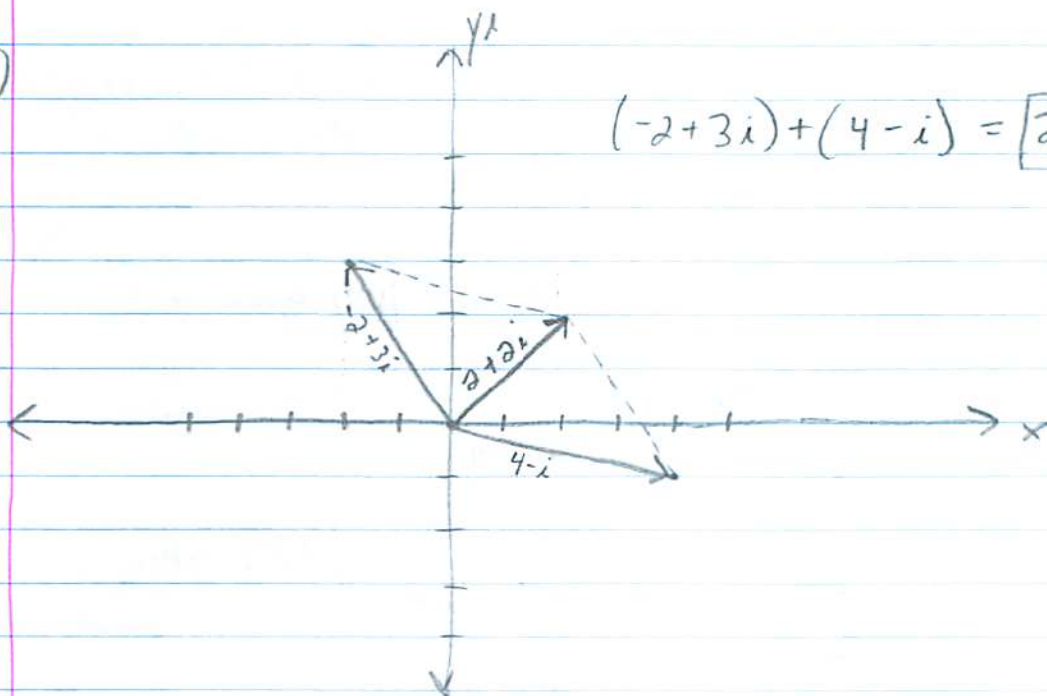
(1) tangent to x-axis

20) discriminant = 100 \Rightarrow positive, perfect square

(4) real, rational, unequal

(21)

$$(-2+3i) + (4-i) = \boxed{2+2i}$$



(22) a) mult. identity = $\boxed{1+0i}$

b) additive identity = $\boxed{0+0i}$