Alg 2: Exam 6 Review Sheet

① $(1-\sqrt{-9})(2-\sqrt{-1})$

$= (1-3i)(2-i)$

$= 2 - i - 6i + 3i^2$

$= 2 - 7i + 3(-1)$

$= 2 - 7i - 3$

$= \boxed{-1 - 7i}$

② $5i^{12} - 2i^{17} + 4i^{10}$

$= 5(1) - 2i + 4i^2$

$= 5 - 2i + 4(-1)$

$= 5 - 2i - 4$

$= \boxed{1 - 2i}$

③ $2\sqrt{-32} - 2\sqrt{-2}$

$= 2i\sqrt{32} - 2i\sqrt{2}$

$= 2i\sqrt{16}\sqrt{2} - 2i\sqrt{2}$

$= 2i(4)\sqrt{2} - 2i\sqrt{2}$

$= 8i\sqrt{2} - 2i\sqrt{2}$

$= 6i\sqrt{2}$

$= \boxed{0 + (6\sqrt{2})i}$

④ $(4-3i)^2$

$= (4-3i)(4-3i)$

$= 16 - 12i - 12i + 9i^2$

$= 16 - 24i + 9(-1)$

$= \boxed{7 - 24i}$

⑤ $(2i^4)^5$

$= (2)^5 (i^4)^5$

$= 32\, i^{20}$

$= 32(1)$

$= \boxed{32 + 0i}$

⑥ $\frac{1}{2i} \cdot \frac{i}{i} = \frac{i}{2i^2}$

$= \frac{i}{2(-1)} = \frac{i}{-2} = \boxed{0 - \frac{1}{2}i}$

⑦ $\frac{3i}{(2-i)} \cdot \frac{(2+i)}{(2+i)}$

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

$= \frac{6i + 3i^2}{4 - (-1)}$

$= \frac{6i - 3}{5} = \boxed{\frac{-3}{5} + \frac{6}{5}i}$

⑧ $(\sqrt{-9})(2\sqrt{-4})$

$= (3i)(2 \cdot 2i)$

$= (3i)(4i)$

$= 12i^2$

$= 12(-1) = \boxed{-12}$

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

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

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

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

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

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

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

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

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

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

$r_1 + r_2 = 4$

$-1 + r_2 = 4$

$\boxed{r_2 = 5}$

$\text{prod} = \frac{c}{2}$

$r_1 r_2 = \frac{c}{2}$

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

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

$\boxed{-10 = c}$

(11) 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) $\frac{x}{\sqrt{x+4}}$

$x + 4 > 0$

$\boxed{x > -4}$ 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 could be $\boxed{2}$

choice (2)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(16) one root = $9-2i$
other root = $9+2i$

$\boxed{x^2 - 18x + 85 = 0}$

sum = $9-2i+9+2i = 18$

prod = $(9-2i)(9+2i) = 81 - 4i^2$
$= 81 - 4(-1)$
$= 81 + 4 = 85$

(17) $9x^2 = 7x + 2$
$9x^2 - 7x - 2 = 0$

$a = 9$
$b = -7$
$c = -2$

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

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

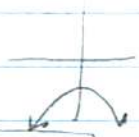
(18) $nx^2 - 7x + 2 = 0$

equal roots
$\Downarrow$
$b^2 - 4ac = 0$

$(-7)^2 - 4(n)(2) = 0$
$49 - 8n = 0$
$8n = 49$
$\boxed{n = \frac{49}{8}}$

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

$b^2 - 4ac$ $a = -1$
$= (1)^2 - 4(-1)(-1)$ $b = 1$
$= 1 - 4$ $c = -1$
$= -3 \Rightarrow$ no real roots



(4) below x-axis

b) $y = 3x^2 - 4x - 3$ $a = 3$
$b^2 - 4ac$ $b = -4$
$= (-4)^2 - 4(3)(-3)$ $c = -3$
$= 16 + 36$
$= 52 \Rightarrow$ positive, not perf square
$\Rightarrow$ 2 x-intercepts

(2) intersects @ 2 pts

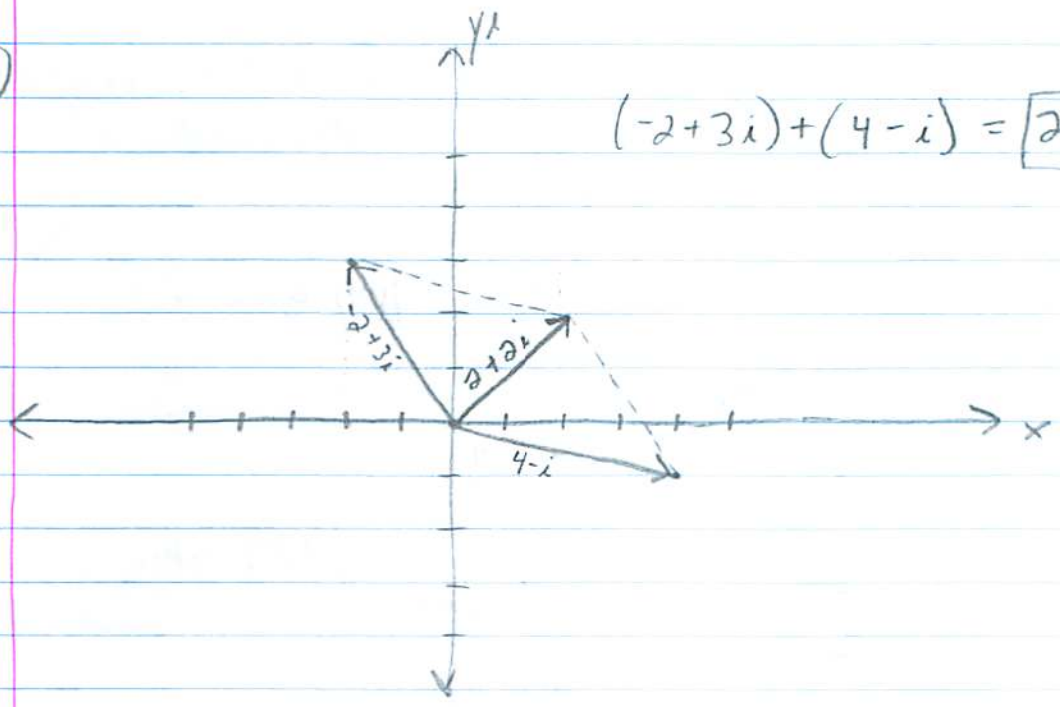
c) $y = 9x^2 - 6x + 1$ $a = 9$
$b^2 - 4ac$ $b = -6$
$= (-6)^2 - 4(9)(1)$ $c = 1$
$= 36 - 36$
$= 0 \Rightarrow$ equal roots
$\Rightarrow$ parabola is tangent to x-axis

(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 = $\boxed{0+0i}$