3-Week Review

Name Key

HAA

Date Today

$x = 250t$ $y = 25.2t$

A small airplane takes off from a field. One second after takeoff the airplane is 250 feet down the runway and 25.2 feet above it. The airplane's ascent continues at a constant rate. Let t represent the time in seconds after takeoff, let x represent the horizontal distance in feet traveled in t seconds and let y represent the vertical distance or altitude in feet traveled in t seconds.

1) Complete each table of:

t	0	1	2	3	4
x	0	250	500	750	1000

t	0	1	2	3	4
y	0	25.2	50.4	75.6	100.8

2) Write a pair of ~~parametric equations:~~ an equation for x in terms of t and an equation for y in terms of t.

$x = 250t$

$y = 25.2t$

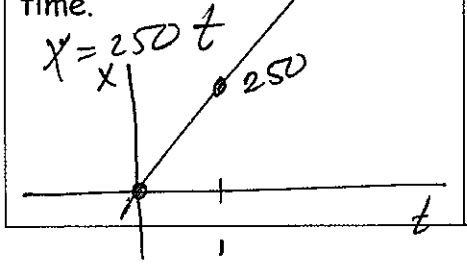
3) Write a linear ~~function for the~~ altitude, y, in terms of horizontal distance traveled, x.

$t = \frac{x}{250}$

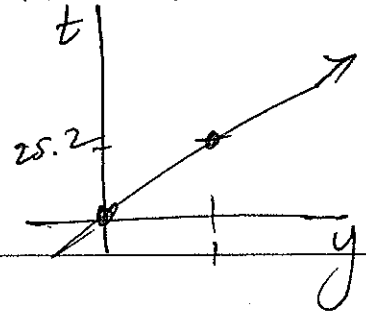
$y = 25.2\left(\frac{x}{250}\right) = y = \frac{63}{625}x$ or $y = .1008x$

(Label all parts of your graph):

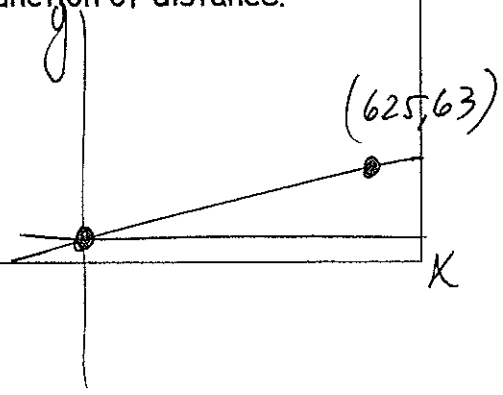
4) Graph the line that represents horizontal distance as a function of time.



5) Graph the line that represents vertical distance as a function of time.



6) Graph the line that represents altitude as a function of distance.



Assume the plane is maintaining its previous flight path.

7) How far will it have gone (horizontally) after 5 minutes? = 300 seconds

$x = 250(300\text{sec}) =$ 75,000 ft

8) What would the plane's altitude ~~be after~~ 7 minutes? = 420 seconds

$y = 25.2(420\text{sec})$ 10,584 ft

9) How long in minutes will it take the plane to go 3,000 feet?

$3000 = 250t$ $t =$ 12 sec

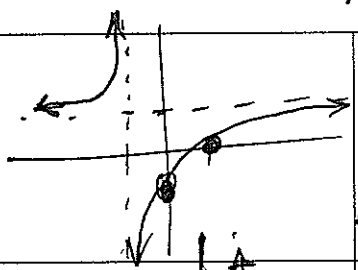
10) How high would the plane be after traveling a distance of 3,000 feet?

$y = 25.2(12) =$ 302.4 ft

Graph each function and show the asymptotes, intercepts and holes.

1) $f(x) = \dfrac{2x-2}{2x+2}$

$\dfrac{2(x-1)}{2(x+1)}$



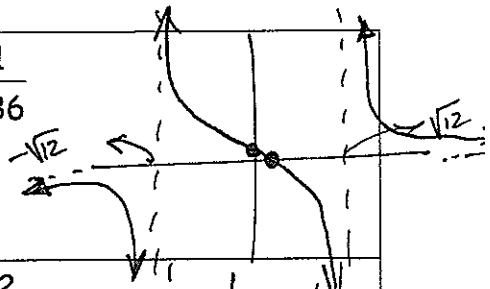
2) $g(x) = \dfrac{3x-1}{3x^2-36}$

$3(x^2-12)$

$\sqrt{12} = 2\sqrt{3}$

$f(-4) = \frac{-}{+}$

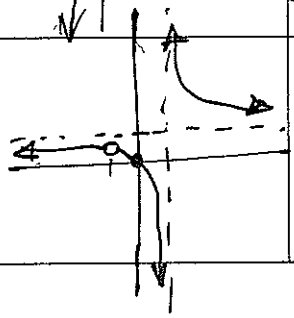
$f(4) = \frac{+}{+}$



3) $m(x) = \dfrac{x+x^2}{x^2-1}$

$\dfrac{x(x+1)}{(x-1)(x+1)}$

hole @ $(-1, \frac{1}{2})$

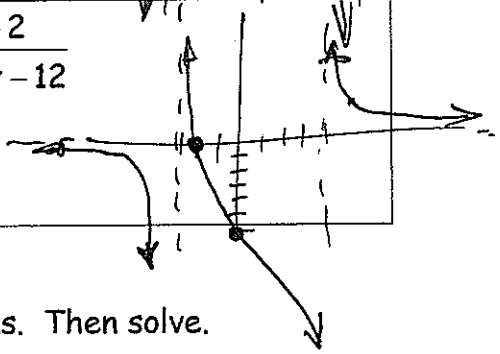


4) $n(x) = \dfrac{x+2}{x^2-x-12}$

$(x-4)(x+3)$

$f(5) = \frac{+}{+}$

$f(-4) = \frac{-}{+}$



Find the discriminant, and determine the number of real solutions. Then solve.

10. $y = x^2 + 5x - 12$

$b^2-4ac = 25-4(1)(-12) =$ 73

2 ℝ solutions

11. $(x-3)(x+2) = 12$ $x^2 - x - 18$

$b^2-4ac = 1-4(1)(-18) =$ 73

2 ℝ solutions

Simplify

12. $2i^{35}$

$\frac{35}{4} = 8\text{ R }3$ $i^3 =$ $-2i$

13. $(3i^7)(5i^{12}) = 15i^{19}$

$i^{19} = i^{16} \cdot i^3 = 1(-i) =$ $-15i$

Find x and y.

12. $6x + 7iy = 18 - 21i$

$6x = 18 \qquad 7iy = -21i$

$x = 3 \qquad y = -3$

13. $2x + 5i = 8 + 20yi$

$2x = 8 \qquad 5i = 20yi$

$x = 4 \qquad \frac{1}{4} = y$

Perform the indicated operation and simplify.

12. $\left(\frac{1}{2} + \frac{2}{5}i\right) + \left(\frac{1}{2} - \frac{1}{5}i\right) = \frac{1}{4} - \frac{1}{10}i + \frac{2}{10}i - \frac{2}{25}$

$\frac{1}{4} + \frac{1}{10}i + \frac{2}{25} = \frac{33}{100} + \frac{1}{10}i$

13. $(8 - 6i) - (4 - 3i)$

$8 - 6i - 4 + 3i$

$4 - 3i$

14. $(2 - 3i\sqrt{2})(2 - 3i\sqrt{2})$

$4 - 6i\sqrt{2} + 18$

$22 - 6i\sqrt{2}$

15. $\frac{(4+2i)(2-i)}{(2+i)(2-i)} = \frac{8+2}{4+1} = 2$

16. $\frac{3+i}{4+i} + 1 + i \quad \frac{3+i}{4+i} + \frac{4+i}{4+i} + \frac{4i-1}{4+i}$

$\frac{6+6i}{4+i}$

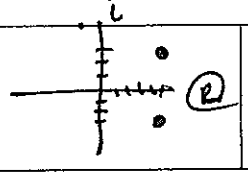
17. $\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right)^2\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right) = \frac{1}{2} + \frac{1}{2}i + \frac{1}{2}i - \frac{1}{2}$

i

Graph each number and its conjugate on a complex coordinate graph.

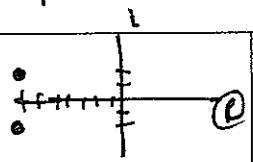
18. $5 + 3i$

conj $= 5 - 3i$



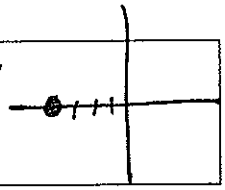
19. $-7 - 2i$

conj: $-7 + 2i$



20. $-4 \quad -4 + 0i$

conj: $-4 - 0i$



Evaluate → find the distance for $(0,0)$ $a^2 + b^2 = d^2$

18. $|2i|$

$\sqrt{0^2 + 2^2} = \sqrt{4} = 2$

19. $|2 + 3i|$

$\sqrt{2^2 + 3^2} = \sqrt{13}$

20. $\left|\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\right| \sqrt{\left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2}$

$= \sqrt{1} = 1$

NAME Key CLASS DATE

Practice Masters Level C

5.6 Quadratic Equations and Complex Numbers

Find the discriminant, and determine the number of real solutions. Then solve.

1. $(x - 3)(x + 2) = 12$ $x^2 - x - 6 = 12$
$x^2 - x - 18$
$b^2 - 4ac = 1 - 4(1)(-18) = 73$, 2 ℝ roots

2. $-4x(x - 1) = -9$ $-4x^2 + 4x = 9 = -4x^2 + 4x - 9$
$b^2 - 4ac = 16 - 4(-4)(-9) = -128$
No ℝ roots

3. $3x^2 = \frac{x + 3}{4}$ $12x^2 - x - 3 = 0$
$b^2 - 4ac = +1 - 4(12)(-3) = 145$, 2 ℝ roots

4. $x(x + 3) = -4$ $x^2 + 3x + 4 = 0$
$b^2 - 4ac = 9 - 4(1)(4) = 25$ 2 ℝ roots

Perform the indicated operations, and simplify. Then name the conjugate of your answer.

5. $\frac{1}{2}(3 - 2i) - \frac{1}{3}(6 + 5i)$
$\frac{3}{2} - i - 2 - \frac{5}{3}i = -\frac{1}{2} - \frac{8}{3}i$

6. $(2 + i\sqrt{5})(-1 + i\sqrt{5})$ $-2 + 2i\sqrt{5} - i\sqrt{5} + 5i^2$
$-2 + i\sqrt{5} - 5 = -7 + i\sqrt{5}$

7. $\frac{15 + 5i}{25 - 5i}$ $\frac{(25+5i)}{(25+5i)} = \frac{375 + 75i + 125i + 25i^2}{625 + 125i - 125i - 25i^2}$
$\frac{350 + 200i}{650} = \frac{7 + 4i}{13}$

8. $i(-5i^2)^2$ $i(25) = 25i$

9. $i^4(6 - 3i) + i^2(2 + i)$ $i^4 = 1$, $i^2 = -1$
$6 - 3i - 2 - i$
$4 - 4i$

10. $\frac{(2 - 7i)}{(3 + 11i)}\frac{(3 - 11i)}{(3 - 11i)} = \frac{6 - 22i - 21i + 77i^2}{9 + 121} = \frac{-71 - 43i}{130}$

11. $(i\sqrt{17} + 3)(i\sqrt{17} + 3) = -17 + 6i\sqrt{17} + 9$
$-8 + 6i\sqrt{17}$

12. $(14 + i\sqrt{21})(14 + i\sqrt{21}) = 196 + 28i\sqrt{21} - 21$
$175 + 28i\sqrt{21}$

Evaluate. Then sketch a diagram that shows the absolute value.

13. $\left|\frac{1}{2} - 4i\right| = \sqrt{\frac{1}{4} + 16} = \sqrt{\frac{65}{4}} = \frac{\sqrt{65}}{2}$

14. $|0.7 - 0.2i| = \sqrt{.49 + .04} = \sqrt{.53} = \frac{\sqrt{53}}{10}$