Pre-Calculus 2.1-2.3 Review WS

Name Key Date______ Per____ Assg# ____

For problems 1 and 2 find the following:

a) All the real zeros
b) y-intercept if any
c) describe the end behavior
d) use the intercepts, end behavior, and number of turns to graph the function. Plot and label all the intercepts and critical poins.

1) $f(x) = x^4 - 2x^3 + x^2$.
2) $f(x) = x^3 + x^2 - 4x - 4$

#1 $x^2(x^2-2x+1)=0$ $(x-1)^2=0$ $x-1=0$ $x=1$ $(1,0)$ mult. 2 $x^2=0$ $x=0$

x	y
-1	4
2	4
1/2	.0625

#2 $x^2(x+1)-4(x+1)=0$ $0=(x+1)(x+2)(x-2)$ $x=-1$ $x=-2$ $x=2$

x	y
-1.5	.875
1	-6

A farmer wants to enclose a rectangular plot for his cattle. If he has 200 ft of fence, then find a) the maximum area and b) the dimensions, if:

3) He will enclose four sides.
4) He will use the back of his house as one side (no fence).
5) He will enclose four sides and an inside partition along side the width.

Solve by using the quadratic formula:

6) $x^2 = -17 + 2x$ $x^2-2x+17=0$
7) $2x + 3 = -2x^2$ $2x^2+2x+3=0$

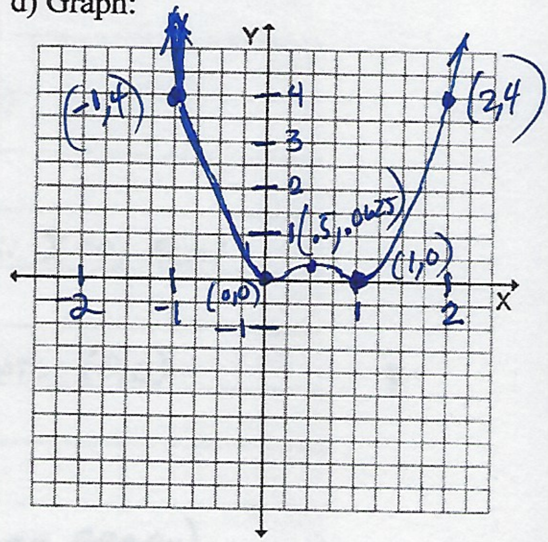
Simplify:

8) $(5-2i)^2$
9) $\frac{2+5i}{3+3i}\cdot\frac{(3-3i)}{(3-3i)} = \frac{21+9i}{18}$ $\frac{7}{6}+\frac{i}{2}$
10) $\frac{-12+\sqrt{-28}}{32}$
11) $\frac{9i}{5-6i}$

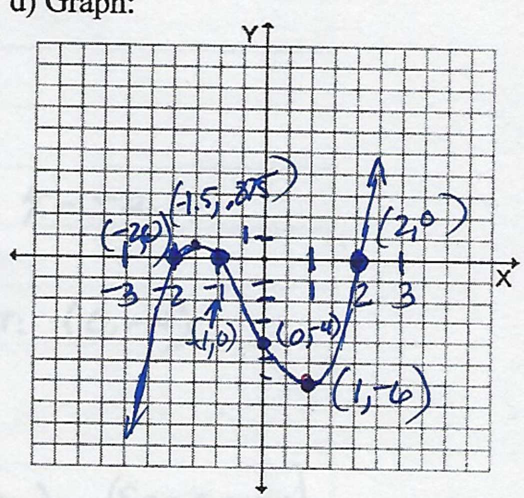
12) Among all pairs of numbers whose difference is 8, find a pair whose product is as small as possible. What is the minimum product? Show the work algebraically using quadratic functions or no credit will be given.
x = Large # $x-8$ = small # $f(x)=x(x-8)$ $\boxed{f(x)=x^2-8x}$ $x=\frac{8}{2(1)}$ $x=4$ $4-8=-4$ Product $4(4-8)$ -16

Identify the domain and range for:
13) $f(x) = -3x^2 + 4x$ $x=\frac{-4}{2(-3)}=\frac{4}{6}=\frac{2}{3}$ $-3\left(\frac{2}{3}\right)^2+4\left(\frac{2}{3}\right)$
14) $f(x) = 4x^2 + 2x - 5$

1) a) zeros: $x=0$ (mult 2); $x=1$ (mult 2)
b) y-int: $(0,0)$
c) as $x\to\infty$, $f(x)\to$ ∞
as $x\to-\infty$, $f(x)\to$ ∞
d) Graph:



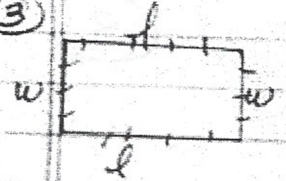
2) a) zeros: $x=-2, x=-1, x=2$
b) y-int: $(0,-4)$
c) as $x\to\infty$, $f(x)\to$ ∞
as $x\to-\infty$, $f(x)\to$ $-\infty$
d) Graph:



3)	a) $2500\,ft^2$ b) $l=50$ ft $w=50$ ft
4)	a) $5000\,ft^2$ b) $l=100$ ft $w=50$ ft
5)	a) $1666\frac{2}{3}\,ft^2$ b) $l=50$ ft $w=33\frac{1}{3}$ ft
6)	$x=1\pm4i$
7)	$x=-\frac{1}{2}\pm\frac{i\sqrt{5}}{2}$
8)	$21-20i$
9)	$\frac{7}{6}+\frac{i}{2}$
10)	$-\frac{3}{8}+\frac{i\sqrt{7}}{16}$
11)	$-\frac{54}{61}+\frac{45i}{61}$
12)	Product: -16 #'s 4 & -4
13)	D: $(-\infty,\infty)$ R: $(-\infty,\frac{4}{3}]$
14)	D: $(-\infty,\infty)$ R: $[-\frac{21}{4},\infty)$

$l, A(l), w$ or $w, A(w), l$

3



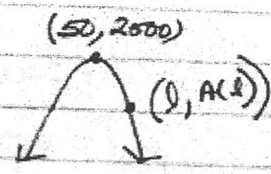
$2l + 2w = 200$

$l + w = 100 \rightarrow w = 100 - l$

$A(l) = l(100 - l)$

$A(l) = -l^2 + 100l$

VERTEX



① $l = \frac{-100}{-2} = 50$

② $A(50) = -(50)^2 + 100(50)$

$= -2500 + 5000$

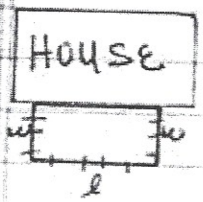
$= 2500$

③ $w = 100 - l$

$w = 100 - 50 = 50$

$\boxed{\text{MAX. AREA} = 2500 \text{ ft}^2 \quad l = 50 \text{ ft} \quad w = 50 \text{ ft.}}$

4

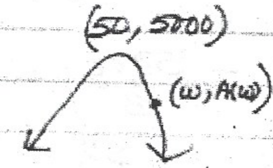


$l + 2w = 200 \qquad l = 200 - 2w$

$A(w) = (200 - 2w)w$

$A(w) = -2w^2 + 200w$

VERTEX



① $w = \frac{-200}{-4} = 50$

② $A(50) = -2(50)^2 + 200(50)$

$= -2(2500) + 10000$

$= -5000 + 10000$

$= 5000$

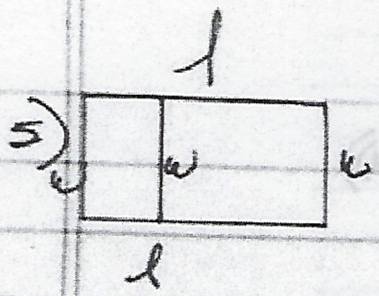
③ $l = 200 - 2(50)$

$= 200 - 100$

$= 100$

$\boxed{\text{MAX. AREA: } 5000 \text{ ft}^2 \quad l = 100 \text{ ft} \quad w = 50 \text{ ft}}$

5)



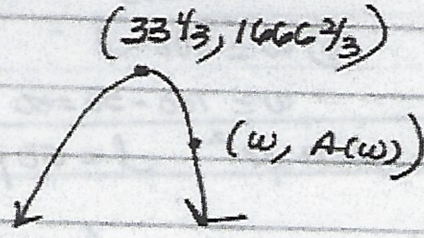
$2l + 3w = 200$

$2l = 200 - 3w$

$l = 100 - \frac{3}{2}w$

$A(w) = \left(100 - \frac{3}{2}w\right)(w)$

$A(w) = -\frac{3}{2}w^2 + 100w$



VERTEX

1. $w = -\frac{100}{-3} = \frac{100}{3} = 33\frac{1}{3}$

2. $A\left(\frac{100}{3}\right) = -\frac{\cancel{3}}{\cancel{2}}\left(\frac{\overset{5000}{\cancel{10000}}}{\underset{3}{\cancel{9}}}\right) + 100\left(\frac{100}{3}\right)$

   $= -\frac{5000}{3} + \frac{10000}{3} = \frac{5000}{3} = 1666\frac{2}{3}$

3. $l = 100 - \frac{\cancel{3}}{\cancel{2}}\left(\frac{\overset{50}{\cancel{100}}}{\cancel{3}}\right)$

   $100 - 50 = 50$

$\boxed{\text{MAX AREA: } 1666\frac{2}{3}\ ft^2,\ l = 50\ ft,\ w = 33\frac{1}{3}\ ft.}$