Name: Key Period: ____________

Math 1050 ---- Concurrent Enrollment 2013-14 ---- Chapter 3.3-5.3 Exam

Circle your high school:

High School

Parowan High School (Warr)

Cedar High School (Whetman)

Canyon View High School (Hulet)

Bryce Valley High School (Lefevre)

Panguitch High School (Lefevre)

Delta High School (Folwles)

Instructions

- Books, notes, calculators with symbolic manipulation, phones, and computers of any type are **NOT** allowed.
- *To receive full credit you must show all necessary work and provide clear explanations.*
- If the statement of a problem uses words like 'find', 'solve', or 'determine' you are expected to give a clear explanation of the mathematical steps and reasoning involved in 'finding', 'solving', or 'determining'.
- Expressions such as $\frac{12}{3}$, $\sqrt{12}$, etc. must be simplified for full credit.
- Neatly write your solutions directly on the exam paper. If a solution requires more space than given, you may continue on the back of the page. Work on scratch paper will not be graded.
- Please write your name on both the cover sheet and your exam

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For administrative use only:

Question	1	2	3a	3b	4	5	6	7	8	9	10	11	Total
Possible	4	9	9	9	8	12	8	12	12	5	6	6	
Score													

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CE MATH 1050 – CHAPTER 3.3-5.3 EXAM 2013

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- When you have completed this section, please return it to the proctor and get the calculator section of the Exam

1. Find the equation for the Horizontal or oblique asymptote of the following function $r(x) = \frac{x^3 + x}{x^2 - 4}$

+4

since $n > m$ by 1 degree we'll have an oblique asymptote
we need to do long division to find the equation in the form $y = mx + b$

$x \leftarrow$ equation for oblique

$$x^2 - 4 \overline{)\, x^3 + 0 + x + 0}$$
$$-(x^3 \quad -4x)$$
$$\boxed{5x} \text{ remainder}$$

$r(x) = x + \frac{5x}{x^2 - 4}$

$\boxed{y = x \text{ is my oblique asymptote}}$

+9 2. For the polynomial $p(x) = (x-1)^2(x+2)^3(x-3)$, answer the following:

a) Find all the zeros of $p(x)$ find zeros by setting $P(x) = 0$

+3

$(x-1)^2(x+2)^3(x-3) = 0$

$x - 1 = 0$ $\quad x + 2 = 0$ $\quad x - 3 = 0$

$x = 1$ $\quad x = -2$ $\quad x = 3$

$\boxed{\text{the zeros of } p(x) \text{ exist at } x = 1, -2, 3}$

b) For each zero of $p(x)$ above, state whether the graph of $p(x)$ touches or crosses the x-axis at that zero.

+3

Since $x = 1$ has a multiplicity of 2 and 2 is even it | touches at $x = 1$
since $x = -2$ has a multiplicity of 3 and 3 is odd it | crosses at $x = -2$
since $x = 3$ has a multiplicity of 1 and 1 is odd it | crosses at $x = 3$

c) Describe the end behavior of $p(x)$. Note: there are many correct ways to describe end behavior. Please write your description in the way that you are most comfortable with.

+3

since the highest power of $p(x)$ is 6 & 1 is the L.C then the power function is $p(x) = x^6$ since the power is even its a parabolic function $\cup$ or $\cap$ since L.C. is positive its $\cup$ opens up

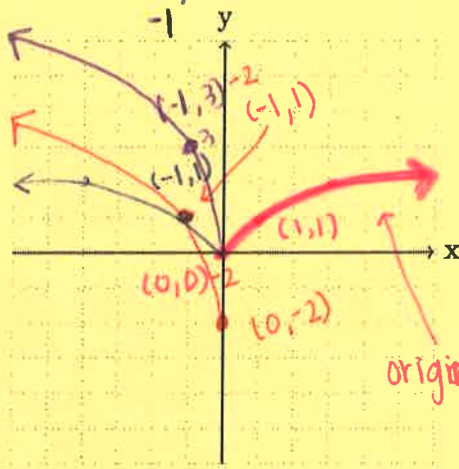
so ~~was~~  as $x \to -\infty$ $y \to \infty$ and as $x \to \infty$ $y \to \infty$

* Remember if its inside the parent function then its a Horizontal transformation (do the opposite) so apply to the all the x's
if its outside the parent function then its a Vertical transform so apply to all the x's

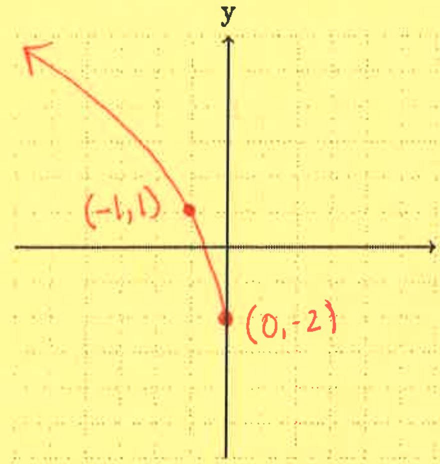
3. For each of the functions below, graph the basic function (for example $y = x^2$). Then use the techniques of shifting, compressing, stretching and/or reflecting to graph each function. Label at least two points on each graph, and any asymptotes. You do NOT need to label the intercepts.

Label!!!

*9 (a) $g(x) = 3\sqrt{-x} - 2$
① mult x's by -1 ② mult y's by 3 ③ subtract 2 from all y's



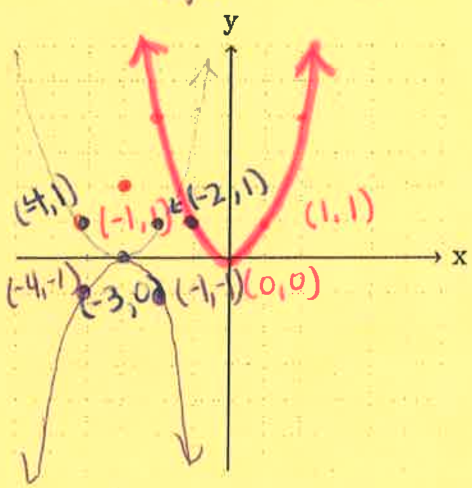
Basic Function



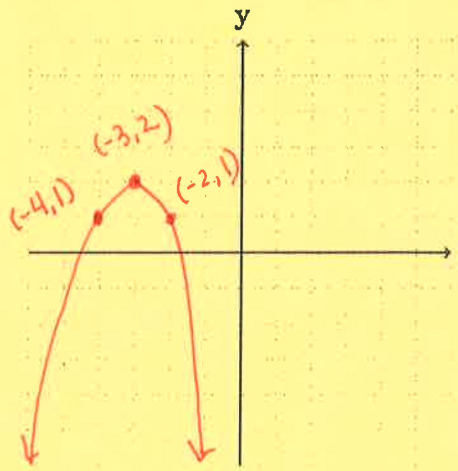
$g(x) = 3\sqrt{-x} - 2$

Label!!

*9 (b) $f(x) = -(x+3)^2 + 2$
① subtract 3 from x's ② mult y's by -1 ③ add 2 to all y's



Basic Function



$f(x) = -(x+3)^2 + 2$

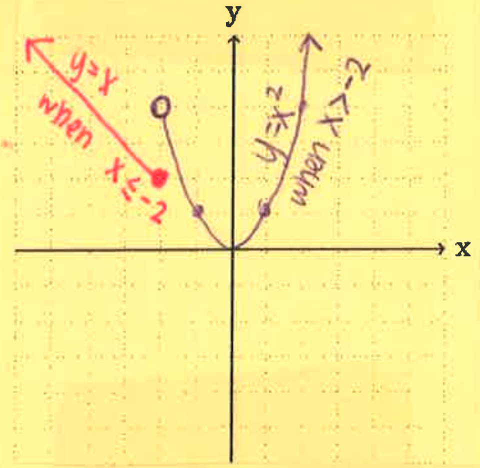
+8

4. Graph the function $g(x) = \begin{cases} -x & \text{if } x \leq -2 \\ x^2 & \text{if } x > -2 \end{cases}$

(-2) (x^2)

$y=-x$ if $x \leq -2$

$y=x^2$ if $x>-2$



if its $\geq$ or $\leq$ Closed circle at that point

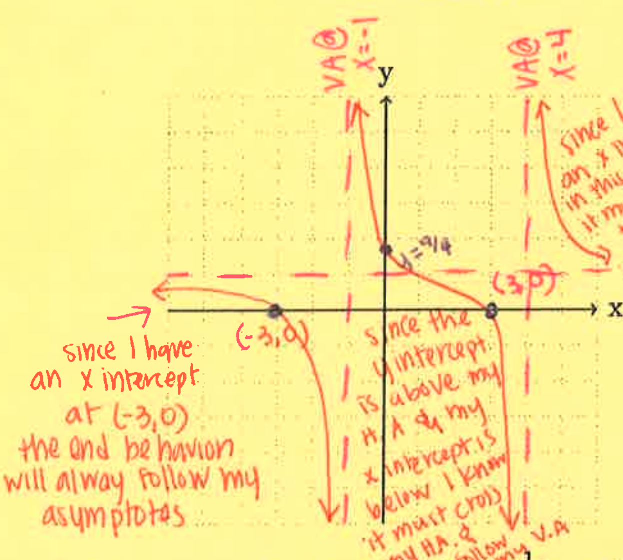
if its $>$ or $<$ then open circle at that point

+12

5. Graph $p(x) = \dfrac{x^2-9}{x^2-3x-4}$. Label intercepts and asymptotes.

$\dfrac{(x+3)(x-3)}{(x+1)(x-4)}$ D: $\{x \mid x \neq -1, 4\}$

$\boxed{\text{VA @ } x=-1,4}$



Since n=m the HA is a $y=\frac{a}{b}$, $y=\frac{1}{1}=1$

$\boxed{\text{HA@ } y=1}$

to find y intercepts let $x=0$

$\dfrac{(0+3)(0-3)}{(0+1)(0-4)} = \dfrac{-9}{-4} = \dfrac{9}{4}$ y inter at $\boxed{y=\frac{9}{4}}$

to find x intercepts let numerator $=0$ & solve

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

$x=-3, 3$

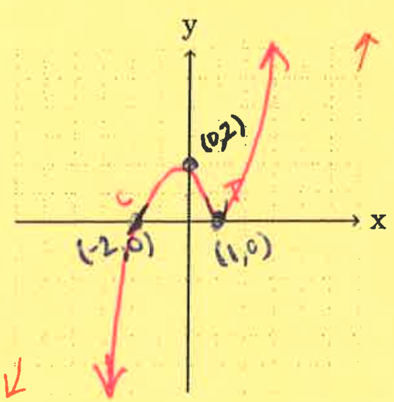
last step would be to plug in point between each interval to see what its doing but I already have enough info to solve

+8

6. Graph the function $q(x) = \frac{1}{4}(x+2)^3(x-1)^2$. Label all intercepts.

power function $q(x)=\frac{1}{4}x^5$ since odd ↗ or ↙ since $\frac{1}{4}$ is positive

so end behavior



The zeros $\frac{1}{4}(x+2)^3(x-1)^2=0$ $x=-2, x=1$

y intercept $\frac{1}{4}(0+2)^3(0-1)^2 = \frac{8}{4} = 2$ $y=2$

max # turning pts $5-1=4$

at $x=-2$ since the multiplicity is 3 it will cross

at $x=1$ multiplicity of 2 it will touch

near $x \approx -2$ $\frac{1}{4}(x+2)^3(-2-1)^2 = \frac{9}{4}(x+2)^3$ cross in a positive direction

near $x \approx 1$ $\frac{1}{4}(1+2)^3(x-1)^2 = \frac{27}{4}(x-1)^2$ touches in positive

connect points

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CALCULATOR

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+12 7. Each of the following problems is worth 3 points. NO justification is required for these problems.

+3 (a) Find the domain of the function $r(x) = \dfrac{7}{5x^2 - 2x}$

$\boxed{D: \{x \mid x \neq 0, 2/5\}}$ .4

$5x^2 - 2x = 0$ $x(5x-2) = 0$

$x = 0$ $5x - 2 = 0$

+2 +2

$5x = 2$

$x = 2/5$

+3 (b) Jill is on an island which is 3 miles from shore. She want to get to a town which is 10 miles down the shoreline from the nearest point to the island. She can row at 3 miles/hour and walk at 5 miles per hour. The time T it takes her to travel to the city if she rows to a point on the shore x miles from town is $T(x) = \frac{1}{5}x + \frac{1}{3}\sqrt{9 + (10-x)^2}$. Use a graphing utility to find the value of x for which T is smallest.

$y = \left(\frac{1}{5}\right)x + \left(\frac{1}{3}\right)\sqrt{9 + (10-x)^2}$ in calc & graph To Find minimum pt $\boxed{2nd}$ $\boxed{trace}$ $\boxed{\#3}$ LB RB guess

at the value $\boxed{x = 7.75}$ there exists a smallest time of 2.8

+3 (c) For the piecewise defined function $g(x)$ given below, find $g(-1)$.

$$g(x) = \begin{cases} 1 - x & \text{if } x \leq -3 \\ x^2 & \text{if } -3 < x \leq 0 \\ 2x - 3 & \text{if } x > 0 \end{cases}$$

* the value of x will only be in the domain restrictions of one of the piecewise fns Never more than one otherwise its no longer a function

since −1 is in the interval $-3 < x \leq 0$ we plug in −1 to x^2

$g(-1) = (-1)^2 = 1$ thus $\boxed{g(-1) = 1}$

+3 (d) The following data represents the weight, in grams, of various candy bars and the corresponding number of calories. Use a graphing utility to find the line of best fit.

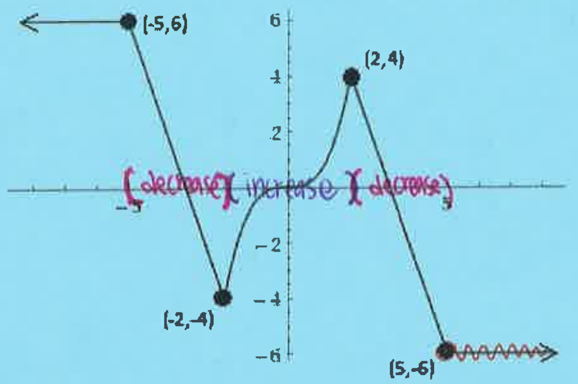
Candy Bar	Weight, x	Calories, y
Nestle's Crunch	44.84	230
Butterfinger	61.30	270
Baby Ruth	66.45	280
Heath	39.52	210
Snickers	61.12	280
Almond Joy	47.33	220

$\boxed{Stats}$ $\boxed{Edit}$ enter data $\boxed{2nd}$ $\boxed{Mode}$ $\boxed{Stats}$ $\boxed{calc}$ $\boxed{\#4}$ $\boxed{enter}$

$y = 2.84x + 96.61$

+12

8. Each of these problems is worth 2 points. No justification is required for these problems. For the graph of $f(x)$, given below, do the following:



+2 (a) Find the domain of $f(x)$

D: $\{x \mid -\infty < x < \infty\}$ (all the x values that the function includes)

or

$(-\infty, \infty)$

+2 (b) Find the range of $f(x)$

R: $\{y \mid -6 \leq y \leq 6\}$ (all the y values that the function includes)

or

$[-6, 6]$

+2 (c) Find the interval(s) on which $f(x)$ is decreasing

* write in terms of X
* if its not an endpoint always use open parenthesis

$(-5,-2) \cup (2,5)$

or

$\{x \mid -5 < x < -2 \cup 2 < x < 5\}$

+2 (d) Find the interval(s) on which $f(x)$ is increasing ↑

$(-2,2)$ or $\{y \mid -2 < y < 2\}$

+2 (e) Find the absolute minimum of $f(x)$, if it exists

The absolute minimum value is -6 when at $x \geq 5$

or $([5,\infty), -6)$ (x y)

+2 (f) State whether $f(x)$ is odd, even, or neither

Since for every point (x,y) on the function there also exists the point $(-x,-y)$ then the function is symmetric to the origin which makes the function an $\boxed{\text{odd function}}$

+5

9. At a certain time ($t = 0$) a car is 10 miles west of a freeway overpass and is approaching the overpass at a constant speed of 80 miles per hour. At the same time, a second car is 2 miles south of the overpass and is driving AWAY from the overpass at a constant speed of 30 miles per hour. Build a model that expresses the distance d between the cars as a function of time t, in hours.

* remember that since the distances create a right triangle then we can use the pythagorean theorem $a^2+b^2=c^2$

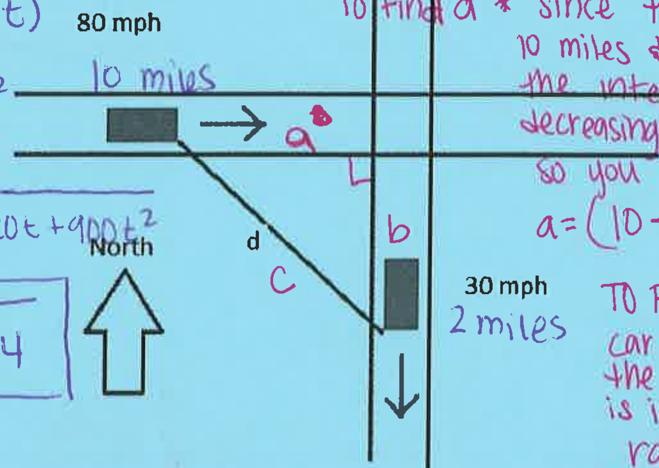
$d^2 = a^2 + b^2$

$d(t)^2 = (10-80t)^2 + (2+30t)^2$

$d(t) = \sqrt{(10-80t)^2+(2+30t)^2}$

$d(t) = \sqrt{100-1600t+6400t^2+4+120t+900t^2}$

$\boxed{d(t) = \sqrt{7300t^2-1480t+104}}$



TO Find a * since the first car starts at 10 miles & is traveling towards the intersection the miles is decreasing as time increases so you subtract the rate × time

$a = (10-80t)$

TO Find b * since the 2nd car is traveling away from the intersection the distance is increasing so add the rate × time

$b = (2+30t)$

Now plug into $a^2+b^2=d^2$

+6 10. Jack has a monthly car payment of \$120. In addition, it costs him \$0.20 for every mile he drives.

cost per mile

original cost no matter how many miles

+3 (a) Write a linear model that relates C, the monthly cost for Jack to drive his car, to x, the number of miles driven.

miles

$C(x) = .2x + 120$

cost per mile   standard fixed cost

+3 (b) Jack has \$160 this month for driving expenses. How far can he drive this month without exceeding this amount?

$160 = .2x + 120$
$-120 \quad -120$

$\frac{40}{.2} = \frac{.2x}{.2}$

$x = 200$

$\boxed{200 \text{ miles}}$

+6 11. For the quadratic function $p(x) = -2x^2 + 8x - 2$, do the following:

+3 (a) Find the vertex.

$(2, 6)$

$-2(x^2-4x)-2$

$-2(x^2-4x+(\frac{-4}{2})^2 - (-2)(\frac{-4}{2})^2 - 2$

$-2(x-2)^2+8-2$

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

or $h = \frac{-b}{2a} = \frac{-8}{2(-2)} = 2$

+3 (b) Find the axis of symmetry.

at $x = 2$ or $h = -\frac{b}{2a} = \frac{-8}{2(-2)} = 2$