Math 1050 — Concurrent Enrollment 2012-13— Final Exam

Circle your high school:

High School
Parowan High School(Warr)
Cedar High School(Whetman)
Canyon View High School(Green)
Bryce Valley High School(Lefevre)
Panguitch High School(Lefevre)
Delta High School(Fowles)
Open High School(Van Ausdal)

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 $\dfrac{12}{3}$, $\sqrt{12}$, $\log_2(4)$, 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 the cover sheet and both portions of your exam.

For administrative use only:

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
Possible	15	5	9	5	18	6	6	6	21	5	6	9	6	4	6	4	8	6	145
Score																			

CE MATH 1050 - Final Exam - 2012-13
NO CALCULATOR

- 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.

- *To receive full credit you must show all necessary work and provide clear explanations.*

- Books, notes, **calculators**, computers, cell phones, and other internet-enabled devices are not allowed.

- When you have completed this section, please raise your hand so the proctor will give you the calculator section of the exam.

1. Each of these problems is worth 3 points. NO justification is required for these problems.

   (a) For the polynomial $p(x) = (x-3)^2(x+1)^3$, list each real zero and its multiplicity.

   (b) Find $\log_{16} 4$.

   (c) Determine whether the equation $4x^2 + 4x + 9y^2 = 9$ is an ellipse, hyperbola, parabola, or circle.

   (d) For the matrices $A = \begin{bmatrix} -1 & -3 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 3 & -1 \end{bmatrix}$, find $A + 2B$.

   (e) The matrix $A = \begin{bmatrix} 7 & -3 \\ -2 & 1 \end{bmatrix}$ has inverse matrix $A^{-1} = \begin{bmatrix} 1 & 3 \\ 2 & 7 \end{bmatrix}$. Use the inverse matrix to solve the system of equations $\begin{cases} 7x & - & 3y = 3 \\ -2x & + & y = 1 \end{cases}$.

2. Write the circle $x^2 - 12x + y^2 + 27 = 0$ in standard form by completing the square.

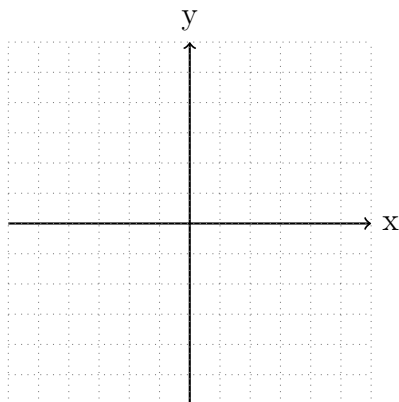3. For $p(x) = x^3 + x^2 - 8x - 6$ do the following:

   (a) Use synthetic division to show that -3 is a zero of $p(x)$.
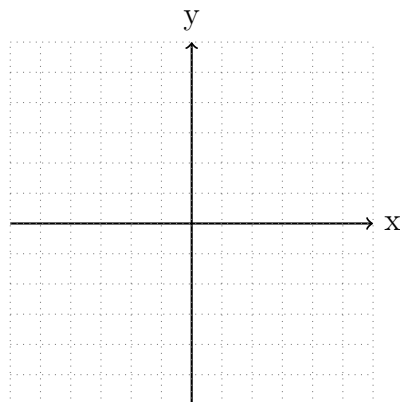
   (b) Find all zeros of $p(x)$.

4. Find $\sum_{k=1}^{25} (3k + 5)$.

5. For each of the functions below, graph the basic function (for example $y = x^2$). Then graph each function. Label at least two points on each graph, and any asymptotes.
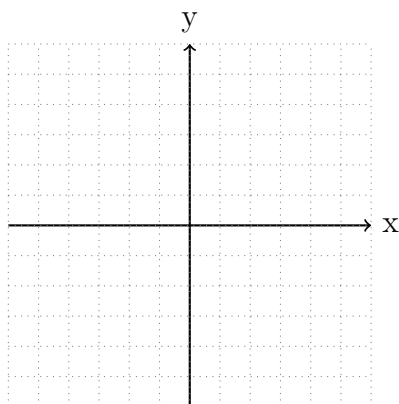
(a) $h(x) = -\left|\frac{1}{2}x\right|$

y

x

Basic Function

y

x

$h(x) = -\left|\frac{1}{2}x\right|$

(b) $g(x) = \dfrac{1}{x-1} - 3$

y

x

Basic Function

y

x

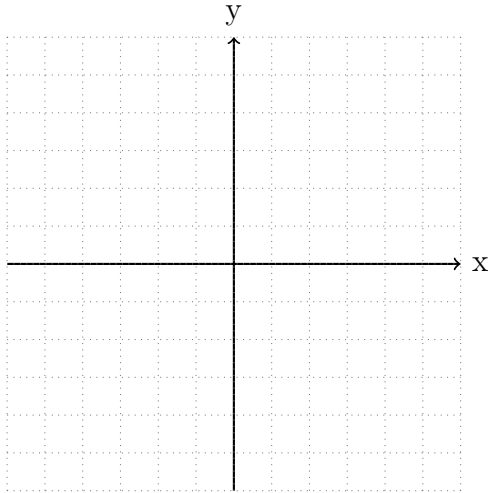$g(x) = \dfrac{1}{x-1} - 3$

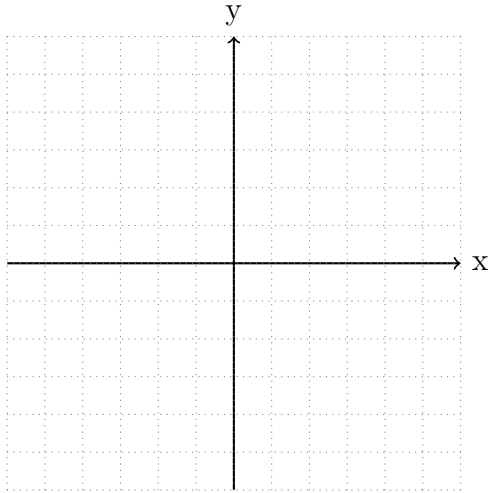(c) $f(x) = 3^{-x} + 1$

y

x

Basic Function

y

x

$f(x) = 3^{-x} + 1$

3
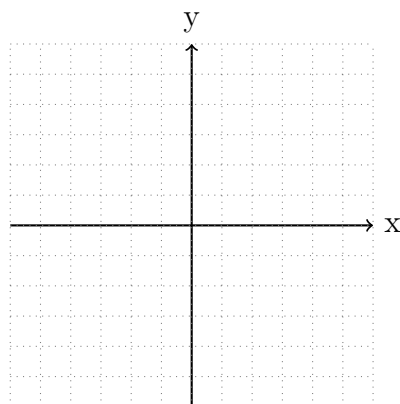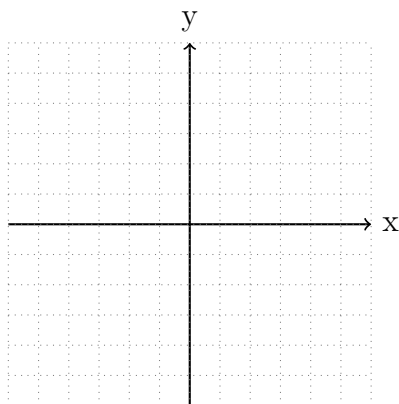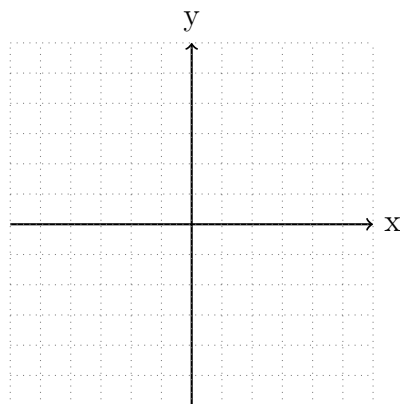
6. Graph $\dfrac{x^2}{4} - \dfrac{y^2}{4} = 1$. Label the vertices, foci, and asymptotes.

7. Graph $x^2 = 8y$. Label the vertex, directrix, and focus.

8. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & -1 & 0 \\ 0 & 3 & -1 \end{bmatrix}$.

CE MATH 1050 - Exam 3 - 2012-13
Calculator allowed

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9. Each of these problems is worth 3 points. NO justification is required for these problems.

(a) Let $f(x) = 3x + 1$ and $g(x) = \sqrt{x-1}$. Find $(g - f)(x)$.

(b) Let $f(x) = 3x + 1$ and $g(x) = \sqrt{x-1}$. Find $(f \circ g)(5)$.

(c) A degree 5 polynomial $p(x)$ with real coefficients has zeros 1, $2i$, and $3 + 5i$. Find the remaining zeros of p.

(d) Find the determinant $\begin{vmatrix} 0 & 0 & 1 \\ 0 & 2 & 3 \\ 1 & 2 & 3 \end{vmatrix}$

(e) Find a formula for the nth term of the geometric sequence $18, -6, 2, -\frac{2}{3}, \dots$.

(f) Determine whether the sequence $200, 180, 160, 140, 120, \dots$ is geometric, arithmetic, or neither.

(g) Find the line of best fit for the data:

x	1	2	2	3	4
y	2	2	3	4	5

10. Find the equation of the line through the points $(3, 7)$ and $(1, 3)$.

11. Find the intercepts of the function $y = \sqrt{x + 4} - 1$.

12. For the rational function $r(x) = \dfrac{3x^2 - 12}{2x^2 - 18}$ do the following:

(a) Find the domain of $r(x)$.

(b) Find the vertical asymptote(s) of $r(x)$, if any.

(c) Find the horizontal asymptote(s) of $r(x)$, if any.

13. The function $f(x) = x^3 - 1$ is one-to-one. Find the inverse function $f^{-1}(x)$.

14. Solve $\log_4(x + 6) = 2$.

15. Solve $e^{x-4} = 2^{-x}$. Give your answer as an exact value and as a decimal rounded to the nearest hundredth.

16. Find the first 5 terms of the sequence defined recursively by $a_1 = 2$, $a_n = 2a_{n-1} + 2$.

17. Use elimination or an augmented matrix to solve the system of equations $\left\{\begin{array}{rcrcrcr} -x & & & - & z & = & 2 \\ 2x & + & y & & & = & -5 \\ 2x & & & + & z & = & 0 \end{array}\right\}$.

18. The matrix $\begin{bmatrix} 1 & 0 & 1 & 7 \\ 0 & 1 & 2 & 2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ represents an augmented matrix for a linear system.

   (a) Write the corresponding set of linear equations.

   (b) Solve the system.