Name: Key Period: ____________

Math 1050 ---- Concurrent Enrollment 2013-14 ---- Chapter 5.4-6 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	3	4a	4b	5	6	7	8	9	10	11	12	13	Total
Possible	3	8	6	8	8	14	7	7	7	12	4	4	7	5	100
Score															

NAME: ______________________________ PERIOD: ______________

CE MATH 1050 – CHAPTER 5.4-6 EXAM 2014

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**, phones, and computers, cell phones, and other internet-enabled devices are **NOT** allowed.
- When you have completed this section, please return it to the proctor and get the calculator section of the Exam

3 1. Use the Factor Theorem to determine whether $x+2$ is a factor of $f(x)=x^4-6x^3+13x^2-12x+4$

(+1) $f(-2)=(-2)^4-6(-2)^3+13(-2)^2-12(-2)+4=$

(+1) $16+48+52+24+4=144$

(+1) NOT A FACTOR

8 2. For $q(x)=x^3-4x^2-5x+20$, answer the following:

a) Find all real zeros of $q(x)$

(+1) or p/q $\pm1, \pm2, \pm4, \pm5, \pm10$ ±20

(+1)
$$\begin{array}{r|rrrr} 4 & 1 & -4 & -5 & 20 \\ & \downarrow & 4 & 0 & -20 \\ \hline & 1 & 0 & -5 & \boxed{0} \end{array}$$

$x^3-4x^2-5x+20$

$x^2(x-4)-5(x-4)=(x^2-5)(x-4)=0$

(+2) (+1)

$x=\pm\sqrt{5}, 4$

b) Factor $q(x)$ over the real numbers.

$(x-4)(x+\sqrt{5})(x-\sqrt{5})$

(+1) (+1) (+1)

6 3. Use logarithm properties to find the exact value:

a) $\log_2 2^{\sqrt{5}}$ $\log_a a^x = x$ $=\boxed{\sqrt{5}}$ (+2)

b) $\log_4 \frac{1}{16}$ $\log_4 4^{-2}=\boxed{-2}$ (+2)

c) $\log_8 2$ $\log_8 8^{1/3}=\frac{1}{3}$ or $8^x=2$ $2^{3x}=2$ $3x=1$ $\boxed{x=\frac{1}{3}}$ (+2)

can't use change of base w/out calculator →

NAME: ______________________________ PERIOD: ______________

CE MATH 1050 – CHAPTER 3.3-5.3 EXAM 2013

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 with symbolic manipulation features, and computers, cell phones, and other internet-enabled devices are **NOT** allowed.

4. 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.

8 a) $f(x) = 2e^{-x} + 1$

$g(x) = e^{x}$

$(-1, \frac{1}{e}), (0, 1)\ (1, e)$

(-1) +1 inside so apply opposite to inside ÷(-1) to all x's

(2) +1 outside so mult all y's by (2)

HA@ y=0 +1

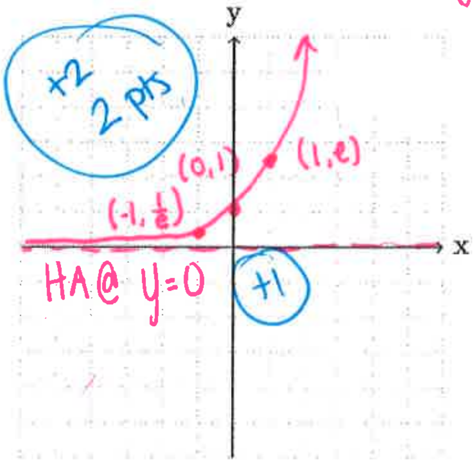
+1 outside add 1 to all y's

(2) (2) (2) (2)

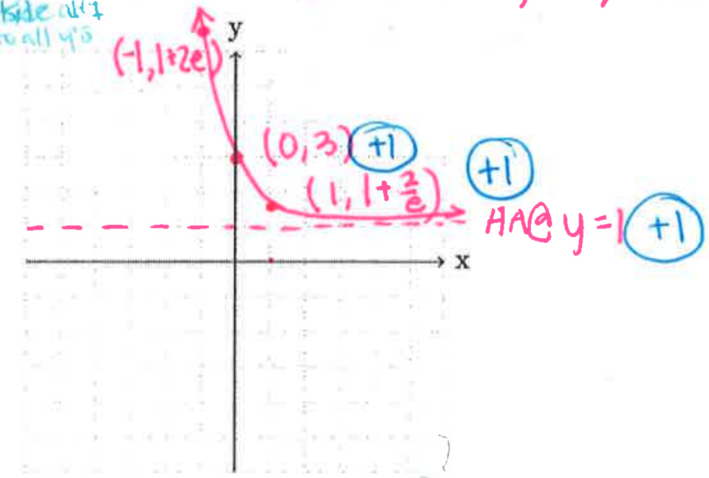
$g(x) = e^{-x}\ (1, \frac{1}{e})\ (0, 1)\ (-1, e)$ HA@ y=0

$g(x) = 2e^{-x}\ (1, \frac{2}{e})\ (0, 2)\ (-1, 2e)$ HA@ y=0 +1 +1 +1 +1

$f(x) = 2e^{-x} + 1\ (1, 1+\frac{2}{e})\ (0, 3)\ (-1, 1+2e)$ HA@ y=1



Basic Function



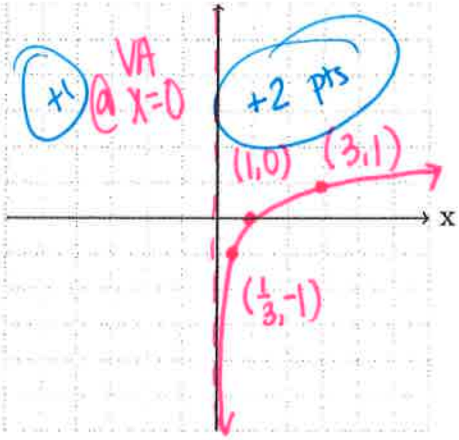
$f(x) = 2e^{-x} + 1$

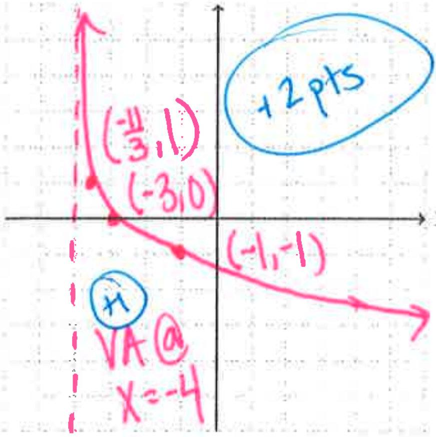
graphed inverse but correct -3 transformations

8 b) $g(x) = -\log_3(x+4)$

$f(x) = \log_3 x$

$(\frac{1}{3},-1)(1,0)(3,1)$ VA @ $x=0$





Basic Function +4 -4 -4 $g(x) = -\log_3(x+4)$

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

Since it's inside do opposite to all x's

$f(x) = \log_3(x+4)$ +1 $(\frac{-11}{3},-1)^{(-1)}$ $(-3,0)^{(-1)}$ $(-1,1)^{(-1)}$ $x=-4$

Since it's outside mult y's by (-1)

$g(x) = -\log_3(x+4)$ +1 $(\frac{-11}{3},1)$ $(-3,0)$ $(-1,-1)$ $x=-4$

14

5. Each of the following problems is worth 2 points. NO justification is required for these problems.

+2 (a) Use a calculator to evaluate $\log_5 3$

Change of base fm $\frac{\log 3}{\log 5} = .683$ +2

+2 (b) Change the logarithmic statement $\ln x^2 = 3$ to an equivalent statement involving an exponent. Do NOT solve.

$\log_e x^2 = 3$

$\boxed{x = \sqrt{e^3}}$ or $\boxed{e^3 = x^2}$ or

$\ln x^2 = 3$

$2 \ln x = 3$

$\ln x = \frac{3}{2}$

$\boxed{e^{3/2} = x}$

+2 (c) List the maximum NUMBER of possible real zeros that $p(x) = x^6 + 16x^5 - 77x^3 - x^2 + 32x - 7$ may have. Do NOT attempt to find the zeros.

$\frac{\pm 1, \pm 7}{\pm 1} = \pm 1 \pm \frac{1}{7} \pm 7$

6

+2 (d) A degree 5 polynomial $f(x)$ has coefficients that are real numbers. If 3, $3+i$, and $-2i$ are zeros of $f(x)$, find the remaining zeros of f.

the conjugate pairs must also be solutions

$\boxed{x = 3 - i, 2i}$

+2 (e) What is the amount that results from investing \$5000 at 5% compounded continuously for 3 years?

$A = 5000e^{.05(t)}$ $\boxed{= \$6809.17}$

+2 (f) Write $2\ln(x-3) - \ln(3x)$ as a single logarithm.

$\ln(x-3)^2 - \ln(3x)$

$= \boxed{\ln \frac{(x-3)^2}{3x}}$

+2 (g) Determine whether the given function is linear, exponential, or neither.

x	$g(x)$
-1	2
0	4
1	6
2	8
3	10

+2

+2

+2

+2

linear

$y = 2x + 4$

7 6. Solve $\dfrac{x^2(x+2)}{(x-1)(x-3)} \geq 0$. Write your answer in interval notation.

+1 +1

$x \neq 1,\ x \neq 3$

$x^2(x+2) = 0$

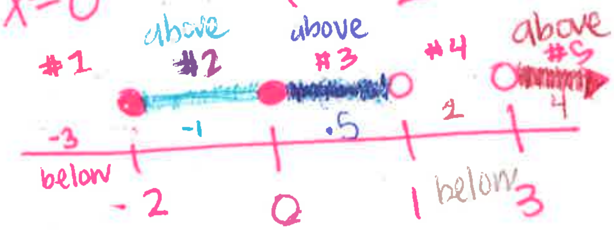
$x^2 = 0$ $\qquad x + 2 = 0$

+1 $x = 0$ $\qquad$ +1 $x = -2$

#1 $\dfrac{\overset{9}{(-3)^2}\overset{-1}{(-3+2)}}{(-3-1)(-3-3)} = \dfrac{(+)(-)}{(-)(-)} = -$ below

$(-4)(-6)$

+1



#2 $\dfrac{(-1)^2(-1+2)}{(-1-1)(-1-3)} = \dfrac{(+)(+)}{(-)(-)} = +$ above

#3 $\dfrac{(.5)^2(.5+2)}{(.5+1)(.5-3)} = \dfrac{(+)(+)}{(-)(-)} = +$ above

$[-2, 1) \cup (3, \infty)$

7 7. For $f(x) = \sqrt{x-2}$ and $g(x) = 3 - x^2$, do the following:

#4 $\dfrac{(2)^2(2+2)}{(2+1)(2-3)} = \dfrac{(+)(+)}{(+)(-)} = -$ below

(a) Find $(f \circ f)(6)$. $\quad f(f(6)) =$

D: $x - 2 \geq 0$

D: $\{x \mid x \geq 2\}$

$f(\sqrt{6-2})$ +

#5 $\dfrac{(4)^2(4+2)}{(4-1)(4-3)} = \dfrac{(+)(+)}{(+)(+)} = +$ above

+2

$f(\sqrt{4}) = f(2) = \sqrt{2-2} = \boxed{0}$

(b) Find $(g \circ f)(x)$.

$g(f(x))$ $\quad f(x) =$ ~~D~~: $\sqrt{x-2}$ so $x - 2 \geq 0$ $\quad x \geq 2$

$g(\sqrt{x-2}) = 3 - (\sqrt{x-2})^2 = 3 - x + 2 = \boxed{-x+5}$ +3

(c) State the domain of $(g \circ f)(x)$. Write your answer in set notation.

~~g(f(x))~~ find domain restrictions for inside function f(x) & entire function

$g(f(x))$ $\quad f(x) = \sqrt{x-2}$ so $x - 2 \geq 0$ $\quad x \geq 2$ $\quad g(f(x)) = -x + 5$

no restriction

7 8. The function $f(x) = -\log_5(x) - 1$ is one-to-one. Find its inverse.

$\boxed{D: \{x \mid x \geq 2\}}$ +2

+1 $y = -\log_5(x) - 1$

+1 $x = -\log_5 y - 1$

$\quad$ +1 $\qquad$ +1

+1 $(-1)(x + 1) = -(\log_5 y) \cdot (-1)$

+1 $-x - 1 = \log_5 y$ switch to exponential

or $y = \dfrac{1}{5^{x+1}}$

+1 $5^{(-x-1)} = y$ $\quad$ Thus +2 $\boxed{F^{-1}(x) = 5^{-x-1}}$

12 9. For $p(x) = 2x^3 - 9x^2 + 14x - 5$ do the following:

(a) List all the possible rational zeros of $p(x)$.

$P = -5 \quad \pm1 \pm5 \quad = \pm1 \pm \frac{1}{2} \pm 5 \pm \frac{5}{2}$

$Q = 2 \quad \pm1 \pm2$

+1 +1 +1 +1

$$\boxed{\pm\frac{1}{2}, \pm1, \pm\frac{5}{2}, \pm5}$$

(b) Use the fact that ½ is a zero of $p(x)$ to find all complex zeros of $p(x)$.

+1

$$\begin{array}{r|rrrr} \frac{1}{2} & 2 & -9 & 14 & -5 \\ & \downarrow & 1 & -4 & 5 \\ \hline & 2 & -8 & 10 & \boxed{0} \end{array}$$

+1

$(x-\frac{1}{2})(2x^2-8x+10)$

$a=2 \quad b=-8 \quad c=10$

↑ use calc or Quadratic Formula

$2x^2-8x+10$ GCF

$2(x^2-4x+5)$

$a= \quad b=-4 \quad c=5$

+1

$$\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(5)}}{2(1)} = \frac{4\pm\sqrt{-4}}{2} \qquad \frac{\cancel{2}(2\pm i)}{\cancel{2}} = 2\pm i$$

+1 +1

$$\boxed{x = \frac{1}{2}, 2\pm i}$$

(c) Factor $p(x)$ completely (over the complex numbers).

+1 +1 +1

$2(x-\frac{1}{2})[x-(2+i)][x-(2-i)]$ or $2(x-\frac{1}{2})(x-2-i)(x-2+i)$

4 10. Solve $e^{4x} = \dfrac{e^2}{e^x}$

$\Rightarrow e^{4x} = e^2 \cdot e^{-x}$ +1

$e^{4x} = e^{2-x}$ +1

$4x = 2-x$ +1

$4x + x - 2 = 0$

$5x = 2$

$\boxed{x = 2/5}$ +1 .4

alternative

$e^{4x} \cdot e^{x} = e^2$

$e^{5x} = e^2$

$5x = 2$

$x = 2/5$

or

x>0

4 11. Solve $2\ln x = 3\ln 4$

+1 $\ln x^2 = \cancel{3}\ln 4^3$

+1 $x^2 = 64$

+1 $x = \pm 8$ Thus $\cancel{\boxed{-8}}$ extraneous solution

+1 $\boxed{x = 8}$

+1 or $\ln x = \frac{3}{2}\ln 4$

+1 $\ln x = \ln 4^{3/2}$ ⇒ +1 $x = 4^{3/2}$

$\boxed{x = 8}$ +1

$\boxed{x = 8}$ only solution

7 12. Solve $5^{2x} = 6^{x-1}$. Leave your answer as an exact value.

Since you cant get X out of the power take the log of both sides

+1 $\ln 5^{2x} = \ln 6^{x-1}$ now we can use the power rule

+1 $2x\ln 5 = (x-1)\ln 6$ ~~Factor~~ Distribute

+1 $2x\ln 5 = x\ln 6 - \ln 6$ get x's to one side

+1 $2x\ln 5 - x\ln 6 = -\ln 6$

Factor out x

+1 $\frac{x(2\ln 5 - \ln 6)}{2\ln 5 - \ln 6} = \frac{-\ln 6}{2\ln 5 - \ln 6}$ +1

+1 $\boxed{x = \frac{-\ln 6}{\ln\left(\frac{25}{6}\right)}}$

5 13. A business is purchased for \$500,00 in 2004 and sold in 2014 for \$600,000. What is the annual rate of return for the investment? Given your answer both as an exact value and as a percentage rounded to 3 decimal places.

it doesnt say anything about compounded

Since it never says its compounded we can use simple Interest to figure this out

+1 $I = Prt$

$A - P = I$ +1

2014 - 2004 = t

$100{,}000 = 500{,}000\,(r)\,10$ +1 +1

$\frac{100{,}000}{500{,}000} = r \cdot 10$

$\frac{\frac{1}{5}}{10} = \frac{10r}{10}$

$\frac{1}{5} \cdot \frac{1}{10} = r$

$.02 = r$

+1 $\boxed{r = 2\%}$