

A2 CC Midterm Review! Part I

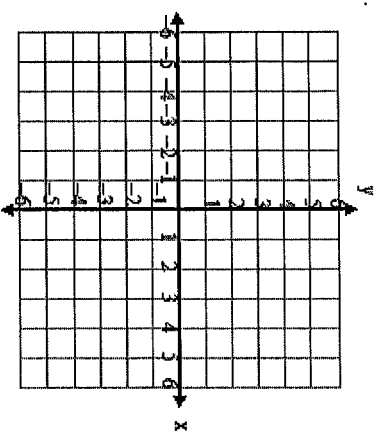
Complete on a SEPARATE SHEET of paper. Any questions that are graphs can be complete on this sheet.

- 1) Solve the system of equations: $-x - 5y - 5z = 2$
 $4x - 5y + 4z = 19$
 $x + 5y - z = -20$
- 2) Solve the equation algebraically: $2x = \sqrt{x+6} - 2$
- 3) Solve the equation $x^2 - 8x = 12$ by completing the square in simplest radical form.
- 4) Factor completely: $x^3 - 49x$
- 5) What is the solution of the inequality $9 - x^2 < 0$?
- 6) Find the average rate of change of the function $y = x^2 - x + 4$ over the following intervals
 - a) $-5 \leq x \leq -2$
 - b) $[2, 5]$
- 7) What is the inverse of the function $f(x) = \frac{6+x}{2x}$?
- 8) The Pell numbers can be defined recursively by the formula, $p(1) = 0$, $p(2) = 1$. Find the value of $p(6)$, given $p(n) = 2p(n-1) + p(n-2)$?

- 9) A parabola has a focus at $(0, 10)$ and a directrix of the x-axis. Write an equation of the parabola.

- 10) a) Graph the piecewise function:

$$h(x) = \begin{cases} 2x-3, & x < 0 \\ x^2 - 6x + 3, & 0 \leq x \end{cases}$$



- b) Describe the end behavior of $h(x)$.
- 11) Solve the system of equations shown below algebraically.

$$(x - 3)^2 + (y + 2)^2 = 16$$

$$x + y = 5$$
- 12) Which of the following functions is even?
 - (1) $f(x) = |x| + 6$
 - (2) $g(x) = -\sin x$
 - (3) $h(x) = (x + 3)^2$
 - (4) $j(x) = 2^x$
- 13) If $f(x) = -2x + 7$ and $g(x) = x^2 - 2$, then $f(g(3))$ is equal to
- 14) Write an expression equivalent to $\sqrt[3]{16x^2y}$ with fractional exponents.

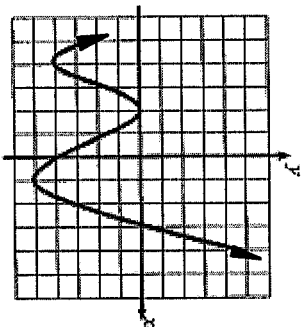
15) Which arithmetic sequence has a common difference of 4?

- (1) $\{0, 4n, 8n, 12n, \dots\}$ (3) $\{n, 4n, 16n, 64n, \dots\}$
 (2) $\{n + 1, n + 5, n + 9, n + 13, \dots\}$ (4) $\{n + 4, n + 16, n + 64, n + 256, \dots\}$

16) a) Using the graph, determine the domain and range.

b) Write a statement for the end behavior.

c) Is this graph a function or one to one function? Explain how you know.



17) Given the parent function $f(x) = x^2$, the function $g(x) = (x - 1)^2 - 2$, write the result of a shift of $f(x)$.

18) Solve the $6x^2 + 3 = 8x$ equations and express the answers in a + bi form

19) The roots of the equation $2x^2 + 5 = 0$ are

- (1) imaginary (3) real, rational, and unequal
 (2) real, rational, and equal (4) real and irrational

20) Solve the equation algebraically. $\sqrt{5x-9}+1=x$

21) Use the recursive sequence defined to find the next three terms. $a_1 = 2$

$$a_n = 3(a_{n-1})^2 + 4n$$

22) Find the values of x, y, z in the following system of equations: $x + y - z = -7$

$$2x + y + z = 0$$

$$x + 2y + z = 4$$

23) Solve algebraically by completing the square: $11 = x^2 + 4x$. State your answer in simplest radical form.

24) Write the expression $(x + 3)^2 + 4(x + 3) + 4$ as the product of two binomials.

25) Represent the solution set of $x^2 - x \geq 6$ as a number line.

26) The table below gives the temperatures, in °F, for the first week in September.

September Date	1	2	3	4	5	6	7
Temperature °F	8	14	4	-1	8	27	28

Determine the average rate of change of the temperature from September 2 to September 5.

27) What is the inverse of the function $f(x) = \frac{8x-1}{3x+1}$?

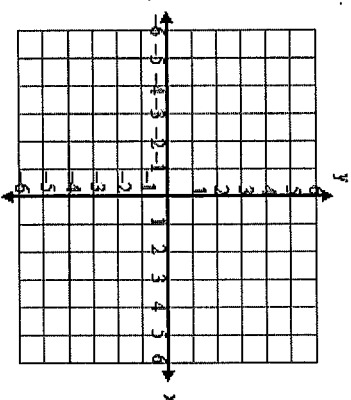
28) Find the sum of the first 12 terms of the geometric series: $2 + 6 + 18 + 54 + \dots$

29) Find the focus and the directrix of the parabola represented by the equation $8(y - 6) = (x + 2)^2$.

30) a) Graph the piecewise function given below.

$$f(x) = \begin{cases} 2x + 2 & x < 1 \\ x^2 - 4x & x \geq 1 \end{cases}$$

- b) State the range of $f(x)$ in interval notation.
 c) Describe the end behavior.
 d) State the y-intercept.
 e) State the x-intercept(s).



A2 CC Midterm Review!

Complete on a SEPARATE SHEET of paper. Any questions that are graphs can be complete on this sheet.

- Solve the system of equations:

$$\begin{aligned} -x - 5y - 5z &= 2 \\ 4x - 5y + 4z &= 19 \\ x + 5y - z &= -20 \end{aligned}$$

$$\begin{aligned} X &= -1 \\ Y &= -3 \\ Z &= 3 \end{aligned}$$
- Solve the equation algebraically: $2x = \sqrt{x+6} - 2$

$$X = \frac{1}{4}$$
- Solve the equation $x^2 - 8x = 12$ by completing the square in simplest radical form.

$$X = 4 \pm 2\sqrt{7}$$
- Factor completely: $x^3 - 49x$

$$X(X+7)(X-7)$$
- What is the solution of the inequality $9 - x^2 < 0$?

$$\left(-\frac{3}{3}, \frac{3}{3}\right) \cup (3, 3)$$
- Find the average rate of change of the function $y = x^2 - x + 4$ over the following intervals
 - $-5 \leq x \leq -2$

$$m = -8$$
 - $[2, 5]$

$$m = 6$$
- What is the inverse of the function $f(x) = \frac{6+x}{2x}$?

$$y = \frac{6}{2x} - 1$$
- The Pell numbers can be defined recursively by the formula, $p(1) = 0, p(2) = 1$. Find the value of $p(6)$, given $p(n) = 2p(n-1) + p(n-2)$?

$$p(6) = 29$$

- A parabola has a focus at $(0, 10)$ and a directrix of the x-axis. Write an equation of the parabola.

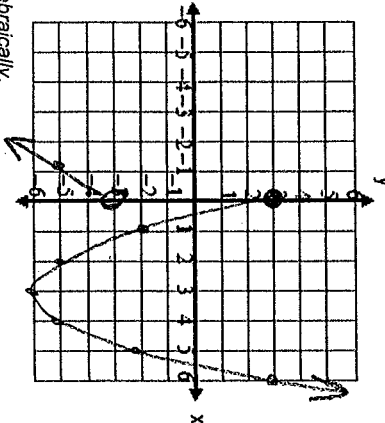
$$y = \frac{1}{20}x^2 + 5$$

- a) Graph the piecewise function:

$$h(x) = \begin{cases} 2x - 3, & x < 0 \\ x^2 - 6x + 3, & 0 \leq x \end{cases}$$

- Describe the end behavior of $h(x)$.

$x \rightarrow -\infty, h(x) \rightarrow -\infty$
 $x \rightarrow +\infty, h(x) \rightarrow +\infty$



- Solve the system of equations shown below algebraically.

$$(x-3)^2 + (y+2)^2 = 16$$

$$x + y = 5$$

$(7, -2)$ $(3, 2)$

- Which of the following functions is even?

- $f(x) = |x| + 6$

$$h(x) = (x+3)^2$$

- $g(x) = -\sin x$

$$j(x) = 2^x$$

- If $f(x) = -2x + 7$ and $g(x) = x^2 - 2$, then $f(g(3))$ is equal to

-7

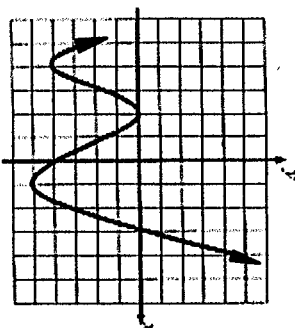
- Write an expression equivalent to $\sqrt[4]{16x^2y}$ with fractional exponents.

$$2x^{\frac{1}{2}}y^{\frac{1}{4}}$$

15) Which arithmetic sequence has a common difference of 4?

- (1) $\{0, 4n, 8n, 12n, \dots\}$ (3) $\{n, 4n, 16n, 64n, \dots\}$
 (2) $\{n+1, n+5, n+9, n+13, \dots\}$ (4) $\{n+4, n+16, n+64, n+256, \dots\}$

16) a) Using the graph, determine the domain and range.



b) Write a statement for the end behavior.
 $x \rightarrow -\infty, f(x) \rightarrow +\infty$
 $x \rightarrow +\infty, f(x) \rightarrow +\infty$
 c) Is this graph a function or one to one function?
 Explain how you know. *OMSSCS VLT*

17) Given the parent function $f(x) = x^3$, the function $g(x) = (x-1)^3 - 2$, write the result of a shift of $f(x)$.

right 1, down 2

18) Solve the $6x^2 + 3 = 8x$ equations and express the answers in a + bi form

$x = \frac{3}{2} \pm \frac{i\sqrt{3}}{2}$

19) The roots of the equation $2x^2 + 5 = 0$ are

- (1) imaginary (3) real, rational, and unequal
 (2) real, rational, and equal (4) real and irrational

20) Solve the equation algebraically: $\sqrt{5x-9} + 1 = x$

$x = 2, 5$

21) Use the recursive sequence defined to find the next three terms. $a_1 = 2$

$a_n = 3(a_{n-1})^2 + 4n$
 $a_1 = 2$
 $a_2 = 20$
 $a_3 = 1212$
 $a_4 = 4400848$

22) Find the values of x, y, z in the following system of equations: $x + y - z = -7$

$2x + y + z = 0$
 $x = -3$
 $y = 1$
 $z = 5$
 $x + 2y + z = 4$

23) Solve algebraically by completing the square: $11 = x^2 + 4x$. State your answer in simplest radical form.

$x = -2 \pm \sqrt{15}$

24) Write the expression $(x + 3)^2 + 4(x + 3) + 4$ as the product of two binomials.

$(x+5)(x+5)$

25) Represent the solution set of $x^2 - x \geq 6$ as a number line.



26) The table below gives the temperatures, in $^{\circ}\text{F}$, for the first week in September.

September Date	1	2	3	4	5	6	7
Temperature $^{\circ}\text{F}$	8	14	4	-1	8	27	28

Determine the average rate of change of the temperature from September 2 to September 5.
 $m = -2$

27) What is the inverse of the function $f(x) = \frac{8x-1}{3x+1}$?

$y = \frac{x+1}{8-3x}$

28) Find the sum of the first 12 terms of the geometric series: $2 + 6 + 18 + 54 + \dots$

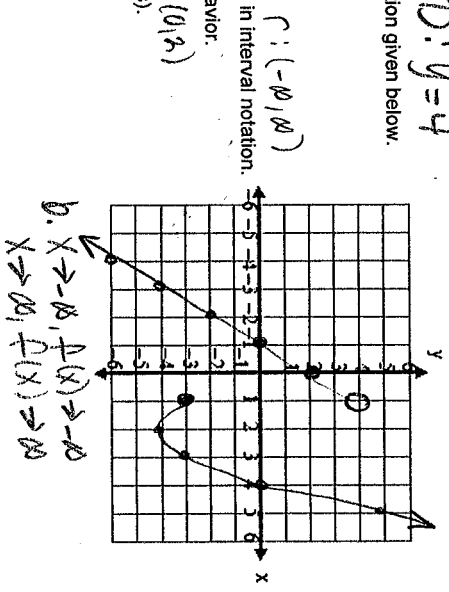
$S_{12} = 531440$

29) Find the focus and the directrix of the parabola represented by the equation $8(y-6) = (x+2)^2$.

$F: (-2, 8)$ $D: y = 4$

30) a) Graph the piecewise function given below.

$f(x) = \begin{cases} 2x+2 & x < 1 \\ x^2-4x & x \geq 1 \end{cases}$



b. $x \rightarrow -\infty, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$

$$1. \begin{cases} -(x-5y-5z)=2 \\ 4x-5y+4z=19 \\ x+5y+5z=-2 \\ 4x-5y+4z=19 \end{cases}$$

$$\begin{cases} 4x-5y+4z=19 \\ x+5y-z=-20 \end{cases}$$

$$5x+3z=-1$$

$$5x+9z=17$$

$$\begin{aligned} 5x+9z &= 17 \\ -1(5x+3z) &= -1 \end{aligned} \quad \begin{aligned} 5x+9z &= 17 \\ -5x-3z &= 1 \end{aligned}$$

$$\begin{aligned} -z+5y-3 &= -20 \\ 5y-5 &= -20 \\ +5 & \quad +5 \\ \hline 5y &= -15 \\ \frac{5y}{5} &= \frac{-15}{5} \\ \boxed{y} &= \boxed{-3} \end{aligned}$$

$$\begin{aligned} 5x+9(3) &= 17 \\ 5x+27 &= 17 \\ -27 & \quad -27 \\ \hline 5x &= -10 \\ \frac{5x}{5} &= \frac{-10}{5} \\ \boxed{x} &= \boxed{-2} \end{aligned}$$

$$\begin{aligned} \frac{0z}{6} &= \frac{18}{6} \\ \boxed{z} &= \boxed{3} \end{aligned}$$

$$2. \begin{cases} 2x = \sqrt{x+6} - 2 \\ +2 \\ \hline 2x+2 = \sqrt{x+6} \end{cases}$$

$$(2x+2)^2 = (\sqrt{x+6})^2$$

$$(2x+2)(2x+2) = x+6$$

$$4x^2+4x+4x+4 = x+6$$

$$4x^2+8x+4 = x+6$$

$$4x^2+7x-2 = 0$$

$$(4x+8)(4x-1) = 0$$

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

$$\boxed{x = -2} \quad \boxed{x = \frac{1}{4}}$$

$$3. \begin{cases} x^2-8x=12 \\ -12 \quad -12 \\ \hline x^2-8x-12=0 \end{cases} \quad \begin{matrix} (-8)^2 \\ (-4)^2 \\ \hline 16 \end{matrix}$$

$$x^2-8x+16-12-16=0$$

$$(x-4)(x-4)-28=0$$

$$(x-4)^2-28=0$$

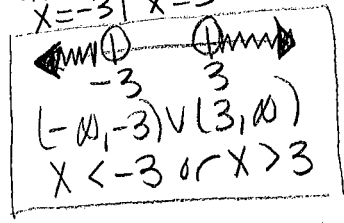
$$\sqrt{(x-4)^2} = \sqrt{28}$$

$$x-4 = \pm\sqrt{4 \cdot 7}$$

$$\boxed{x = 4 \pm 2\sqrt{7}}$$

$$4. \begin{cases} x^3-49x \\ x(x^2-49) \\ x(x+7)(x-7) \end{cases}$$

$$5. \begin{cases} a-x^2 < 0 \\ -a+x^2 > 0 \\ x^2-a > 0 \\ (x+3)(x-3) = 0 \\ x=-3 \quad x=3 \end{cases}$$



$$6. a. \begin{cases} (-5, 34) \\ (-2, 10) \\ m = \frac{10-34}{-2+5} = \frac{-24}{3} \\ \boxed{m = -8} \end{cases}$$

$$b. (2, 6) \\ (5, 24)$$

$$8. p(n) = 2p(n-1) + p(n-2) \quad m = \frac{24-6}{5-2} = \frac{18}{3} \\ \boxed{m = 6}$$

$$p(3) = 2(1) + 0 = 2$$

$$p(4) = 2(2) + 1 = 5$$

$$p(5) = 2(5) + 2 = 12$$

$$p(6) = 2(12) + 5 = \boxed{29}$$

$$9. p=5, v(0,5) \\ y = \frac{1}{4(5)}(x-0)^2 + 5 \\ \boxed{y = \frac{1}{20}x^2 + 5}$$

$$7. \begin{cases} x = u+y \\ \frac{1}{2} \quad \frac{1}{2}y \\ 2xy = u+y \\ -y \quad -y \\ \hline 2xy - y = 6 \\ y(2x-1) = 6 \\ \frac{2x-1}{2x-1} \quad \frac{6}{2x-1} \\ \boxed{y = \frac{6}{2x-1}} \end{cases}$$

10. on graph

$$11. (x-3)^2 + (y+2)^2 = 16 \quad \begin{matrix} x+y=5 \\ -x \quad -x \end{matrix}$$

$$(x-3)^2 + (5-x+2)^2 = 16 \quad y = 5-x$$

$$(x-3)^2 + (7-x)^2 = 16$$

$$(x-3)(x-3) + (7-x)(7-x) = 16$$

$$x^2 - 3x - 3x + 9 + 49 - 7x - 7x + x^2 = 16$$

$$2x^2 - 20x + 58 = 16$$

$$\frac{-16 \quad -16}{2x^2 - 20x + 42 = 0}$$

$$2(x^2 - 10x + 21) = 0$$

$$2(x-7)(x-3) = 0$$

$$x=7 \quad x=3$$

$$y=5-7 \quad y=5-3$$

$$y=-2 \quad y=2$$

$(7, -2)$	$(3, 2)$
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$$19. 2x^2 + 5 = 0$$

$$b^2 - 4ac$$

$$(0)^2 - 4(2)(5) = \boxed{-40}$$

imag. (i)

$$12. (1)$$

reflect
y axis
even

$$13. f(g(3))$$

$$g(3) = (3)^2 - 2 = 7$$

$$f(7) = -2(7) + 7 = \boxed{-7}$$

$$14. \sqrt[4]{16x^2y} \\ = 16^{\frac{1}{4}} x^{\frac{2}{4}} y^{\frac{1}{4}} \\ = \boxed{2x^{\frac{1}{2}} y^{\frac{1}{4}}}$$

$$15. (1)$$

interval	set
Domain: $(-\infty, \infty)$	\mathbb{R}
range: $[-5, \infty)$	$y \geq -5$

b. $x \rightarrow -\infty, f(x) \rightarrow +\infty$
 $x \rightarrow +\infty, f(x) \rightarrow +\infty$

c. passes VLT.

$$20. \sqrt{5x-9} + 1 = x$$

$$(\sqrt{5x-9})^2 = (x-1)^2$$

$$5x-9 = (x-1)(x-1)$$

$$5x-9 = x^2 - 1x - 1x + 1$$

$$5x-9 = x^2 - 2x + 1$$

$$-5x+9 \quad -5x+9$$

$$0 = x^2 - 7x + 10$$

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

$x=5$	$x=2$
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$$17. \text{right 1, down 2}$$

$$18. 6x^2 + 3 = 8x$$

$$-8x \quad -8x$$

$$6x^2 - 8x + 3 = 0$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(6)(3)}}{2(6)}$$

$$x = \frac{8 \pm \sqrt{64 - 72}}{12} = \frac{8 \pm \sqrt{4 \cdot 2 \cdot (-1)}}{12}$$

$$x = \frac{8 \pm 2i\sqrt{2}}{12}$$

$$x = \frac{4 \pm i\sqrt{2}}{6}$$

$$\boxed{x = \frac{2}{3} \pm \frac{i\sqrt{2}}{6}}$$

21. $a_1 = 2$
 $a_2 = 3(2)^2 + 4(2) = 20$
 $a_3 = 3(20)^2 + 4(3) = 1212$
 $a_4 = 3(1212)^2 + 4(4) = 4406848$

22. $x + y - z = -7$ $2x + y + z = 0$
 $2x + y + z = 0$ $-(x + 2y + z = 4)$
 $3x + 2y = -7$ $2x + y + z = 0$
 $-x - 2y - z = -4$

$3x + 2y = -7$
 $2(x - y = -4)$
 $3x + 2y = -7$
 $2x - 2y = -8$
 $5x = -15$
 $x = -3$

$2x + y + z = 0$
 $-x - 2y - z = -4$
 $x - y = -4$
 $-3 - y = -4$
 $+3$ $+3$
 $-y = -1$
 $y = 1$

23. $11 = x^2 + 4x$ $(\frac{4}{2})^2 = 4$
 -11 -11
 $0 = x^2 + 4x - 11$
 $0 = x^2 + 4x + 4 - 11 - 4$
 $0 = (x+2)(x+2) - 15$
 $0 = (x+2)^2 - 15$
 $+15$ $+15$
 $\sqrt{15} = \sqrt{(x+2)^2}$
 $\pm\sqrt{15} = x+2$
 -2 -2
 $-2 \pm \sqrt{15} = x$

24. $(x+3)^2 + 4(x+3) + 4$
 $y = x+3$
 $y^2 + 4y + 4$
 $(y+2)(y+2)$
 $(x+3+2)(x+3+2)$
 $(x+5)(x+5)$

$-3 + 1 - z = -7$
 $-2 - z = -7$
 $+2$ $+2$
 $-z = -5$
 -1 -1
 $z = 5$

26. $(2, 14)$
 $(5, 8)$ $m = \frac{8-14}{5-2} = \frac{-6}{3} = -2$
 $m = -2$

25. $x^2 - x \geq 6$
 -6 -6
 $x^2 - x - 6 \geq 0$
 $(x-3)(x+2) = 0$
 $x = 3$ $x = -2$
 \leftarrow \rightarrow
 -2 3

27. $x = 8y - 1$
 1 $3y + 1$
 $8y - 1 = 3xy + x$
 $-3xy + 1 - 3xy + 1$
 $8y - 3xy = x + 1$
 $y(8 - 3x) = x + 1$
 $8 - 3x$ $8 - 3x$
 $y = \frac{x+1}{8-3x}$

28. $S_n = \frac{a_1 - a_1 r^n}{1 - r}$
 $S_{12} = \frac{2 - 2(3)^{12}}{1 - 3}$
 $S_{12} = 531440$

29. $8(y-6) = (x+2)^2$
 8 8
 $y - 6 = \frac{1}{8}(x+2)^2$
 $+6$ $+6$
 $y = \frac{1}{8}(x+2)^2 + 6$
 $p = 2$

F: $(-2, 8)$
V: $(2, 6)$
D: $y = 4$

30. on graph