WSU Math 1010 Intermediate Algebra Concurrent Enrollment
Midterm Review

When you take the test, it is very important to read each question carefully.
Scientific Calculator allowed on the test.

1. Explain the difference between the domain and the practical domain of a function.

2 & 3. *Your job requires you to attend meetings at other locations which are within 50 miles of your office. You are reimbursed at the rate of $0.51 per mile for this travel*

2. Write a verbal statement that describes how the amount of reimbursement is determined.

3. a) Identify the input variable of the function from #2.

   b) What is the practical domain of the function?

   c) What is the practical range of the function?

4. You and three friends work at a job and each of you receive a different hourly wage, based on experience. Does this scenario, where the input is the number of hours worked, and the output is the wages received describe a function? Why or why not?

For #5, multiply each expression. Write your answer in simplest form
5. $(x-5)(4x^2 - x + 3)$

6. Simplify $\dfrac{18x^3y^9z^5}{3x^6y^2z^4}$. Write with positive exponents only.

7. Simplify. Write the expression with positive exponents only.
   $(x^{-4})^2(3x^5)(-2x^0)$

8. Explain the difference between $4x^0$ and $(4x)^0$

9. Evaluate

$$(-32)^{-\frac{3}{5}}$$

10. Simplify then write in radical form.

$$(x^{-\frac{1}{5}})^{-\frac{1}{3}}$$

11. Simplify then write in radical form.

$$x^{\frac{1}{4}} \cdot x^{\frac{2}{3}}$$

12. Simplify then write in radical form.

$$\frac{x^{\frac{2}{3}}}{x^{\frac{2}{5}}}$$

13. Convert $y^{\frac{4}{5}}$ to radical form.

14. Convert $\sqrt[7]{xy^5z^2}$ to exponential form.

15. Calculate the rates of change between consecutive pairs of points and determine which of the following functions are linear.

x	f(x)
1	30
3	90
5	150
7	210

x	g(x)
15	40
18	65
21	85
24	100

x	h(x)
2	7
5	16
10	31
20	61

16. a. Give an example of an equation that represents a vertical line. What is the slope of this line?

  b. Give an example of an equation that represents a horizontal line. What is the slope of this line?

17. Suppose your distance in miles from home on the third day of your trip is represented by the function $d(t) = 65t + 310$, where t represents the number of hours you drive that day.

  a. What is the slope of the line (with units)?

  b. Give a practical meaning for the slope related to this situation.

  c. What is the vertical intercept of the line?

  d. Give a practical meaning for the vertical intercept related to this situation.

18. Functions can be represented in four ways – numerically, graphically, symbolically, & verbally. For each of the following functions, one way of representing the function is given – represent it in the three other ways.

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	Numerically		Graphically – be sure to label your axes!	Symbolically	Verbally
Example A	Time (min)	Water Level			
	2	4			
	3	6			
	4	8			
	5	10			
Example B			Temperature Change graph: Temperature (Fahrenheit) vs Minutes, line passing through (2, 150) and (3, 190)		
Example C				$C = .25g$ $g = gallons\ of\ water\ used$ $c = cost\ of\ water\ usage$	
Example D					The cost of production of a type of tablet is $100 dollars per tablet with an initial start-up cost of $500.

19. In words, give a real life example of a discrete function and draw a graph to represent it.

20. If the ordered pair (8, 3) belongs to function g, then $g(\quad) = $ _____.

21. Given $h(2) = 9$ and $h(x) = ax^2 + 3x - 9$ find the value of a.

22. In solving a system of <u>**two equations in two variables**</u>, the final step yields the following equation: $0 = 0$

   a. How many solutions does this system have?
   b. Explain what the graph of this system would look like.

In solving another system of two equations in two variables, the final step yields this equation: $0 = 7$
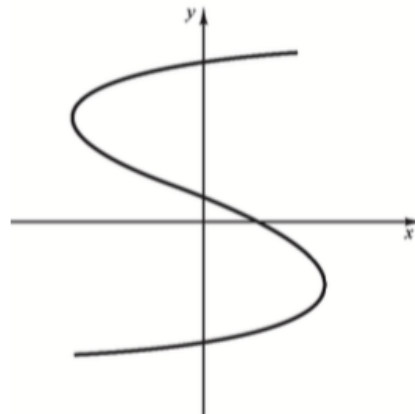
   c. How many solutions does this system have?
   d. Explain what the graph of this system would look like.

23. Use the vertical line test to determine if each graph represents a function.
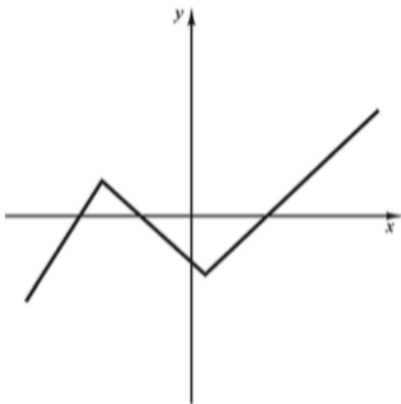
a)   b)

24. According to the National Bar Association, from 1980 to 2013, the number of U.S. lawyers increased in thousands from 575 to 1268.

    a.   The number of U.S. lawyers is a function of the number of years since 1980 (use 0 to represent the year 1980, 1 to represent 1981, and so forth). Write the two ordered pairs describing this situation.

    b.   Assume that this function is linear, and write the slope-intercept equation of the line that represents this data.

    c.   What is the practical meaning of the slope in this equation? (Remember, your slope is in thousands.)

    d.   How many lawyers were there in the United States in 2000?

25. For the graph to the right:

a. What is the independent, or input variable?

b. What is the dependent, or output variable?

c. Is the relationship a function?

d. Is the relationship linear?

e. Is the relationship increasing or decreasing?

f. Is this relationship discrete or continuous? Explain

g. What is the domain & range? Give them in interval notation.

h. How much money will there be in 8 years?
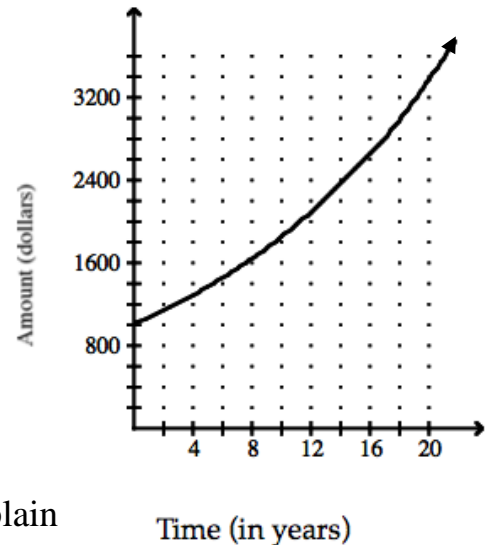
26. Solve the following systems of three equations in three variables AND identify which of the following diagrams represents the system. Explain your choice. Is the system dependent, consistent, or inconsistent?
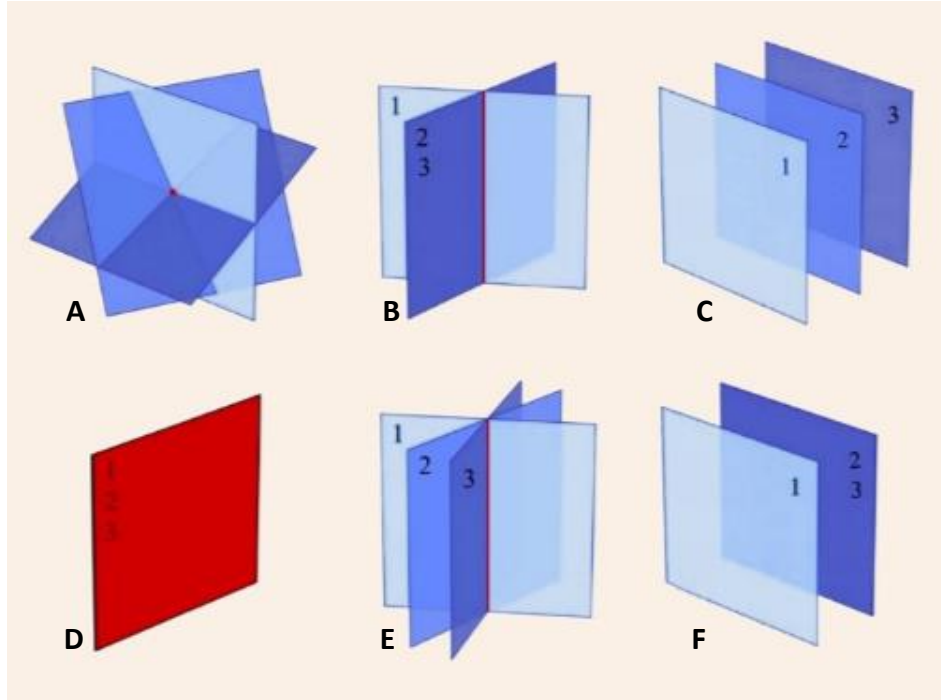
$$i) \begin{cases} x + y - z = 5 \\ 2x + 2y - 2z = 10 \\ 10x + 10y - 10z = 50 \end{cases}$$

$$iii) \begin{cases} 2x - y + z = 5 \\ x - y - z = 1 \\ 6x + 3y - 2z = 10 \end{cases}$$

$$ii) \begin{cases} 3x - 4y - 3z = -5 \\ 6x - 8y - 6z = -3 \\ 12x - 16y - 12z = -6 \end{cases}$$

$$iv) \begin{cases} x - y + z = 2 \\ 3x - 3y + 3z = 5 \\ -x + y - z = 6 \end{cases}$$

27. Why is $(2x^3)^{-1} \neq 2x^{-3}$?

28. Explain why $\sqrt[3]{-64} = -\sqrt[3]{64}$, but $-\sqrt{64} \neq \sqrt{-64}$.

29. Choose values for n, a, and b to demonstrate whether the following is a true or false statement.

$$\sqrt[n]{a} + \sqrt[n]{b} = \sqrt[n]{a + b}$$

30. Multiply, then simplify the product. Assume all variables represent positive real numbers.

   a. $\sqrt[3]{4xy} \cdot \sqrt[3]{9xy}$

   b. $(9+\sqrt[3]{2})(9 - \sqrt[3]{2})$

   c. $(7 + \sqrt{3})^2$

31. Combine the following terms if possible.

   a. $8\sqrt[4]{x^7} - 4x\sqrt[4]{x^3}$

   b. $15\sqrt[3]{2} - 3\sqrt[3]{54}$

   c. $2\sqrt[3]{8x} + 2\sqrt[3]{64x}$

32. Rationalize the denominator to simplify: $\dfrac{5x}{\sqrt{x^7}}$.

33. Divide
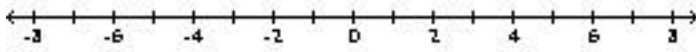
   a. $\dfrac{21x^7 + 12x^6 + 18x^5}{3x^6}$

   b. $\dfrac{36y^4 + 12y^3 + 2y - 1}{6y^2 + 1}$

   c. $\dfrac{4r^3 - 3r^2 - 1r - 18}{4r^2 + 5r + 9}$

34. Explain the difference between the solution of an inequality like:
$-4(3y + 6) < -16y + 12$
and the solution of an equation like : $-4(3y + 6) = -16y + 12$.

35. Solve the inequality below. Graph the solution and write it in interval notation.
  b) $-4 < -2p + 3 \leq 11$

36. Explain why $\sqrt{2x + 1} = -4$ has no solution.

37. Solve the equation and check your answer.
  $10\sqrt{x + 2} = 20$

38. Solve the equation and check your answer.
  $2\sqrt{3x} - \sqrt{5x + 7} = 0$

OPTIONAL
More procedural practice

1. Express or write the ordered pair (5,30) using function notation where the function is C(s).

For #2, multiply each expression. Write your answer in simplest form

2. $(x + 3)(x^2 - 4x + 6)$

3. Solve each system of equations using substitution or elimination. Check your solution by graphing each system.

    a) $y = 5$ b) $2x - 2y = 4$

        $y = -2x - 4$ $3x + 5y = 14$

4. Write the equation of the line that satisfies the following conditions.

    a. $m = -\frac{1}{2}$ and $f(2) = 3$

    b. the line passes through the point (2,4) and $f(1) = 2$

5. Graph each equation linear equation. Identify the slope, the x-intercept and the y-intercept.

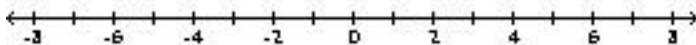   a. $y = -\frac{2}{3}x + 5$ b. $2x - 3y = 12$

6. Find the equation of the line that passes through the points $(-3,1)$ and $(2,16)$. Is the line increasing decreasing or neither? Explain how you know.

7. Rationalize the denominator to simplify. $\dfrac{4z^2}{\sqrt{18z^3 a}}$

8. Divide: $\dfrac{x^4 + 9x^2 + 10}{x^2 + 1}$

9. Solve the inequalities below. Graph the solution and write it in interval notation.

    a) $m - 2(m + 4) < 3m$

10. Solve the equation and check your answer. (Bonus Question ☺)

    $\sqrt[3]{4x + 1} = -3$