Last Name:_____ First Name:_____

1.) __Neither__

2.) __Neither__

3.) __Arithmetic__

4.) __14__

5.) __150__

6.) __1,275__

7.) __$3(4)^{52}$__

8.) __143__

9.) __380__

10.) __$28/3$__

11.) __$\binom{8,000}{30}$__

12.) __$\dfrac{8,000!}{7,980!}$__

13.) __60__

14.) __$8,000!$__

15.) __84__

16.) __$(x^{300}+2)^{200}+3$__

17.) __$\mathbb{R}$__

18.) __$\mathbb{R}-\{7/5\}$__

19.) __1__

20.) __$\mathbb{R}-\{1\}$__

21.) __$(-3,\infty)$__

22.) __$-1, 7$__

23.) __-1__

24.) __Yes__

* * * * * * * * * * * * * * *
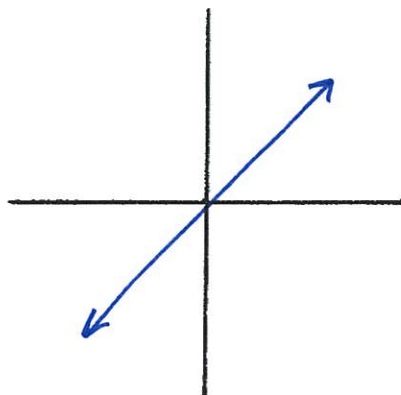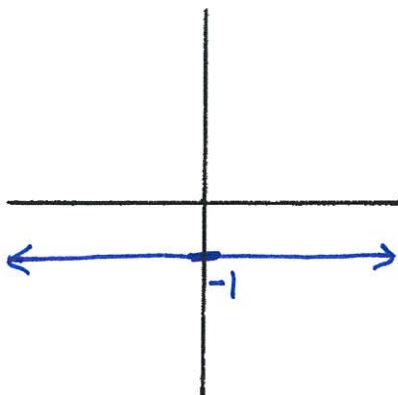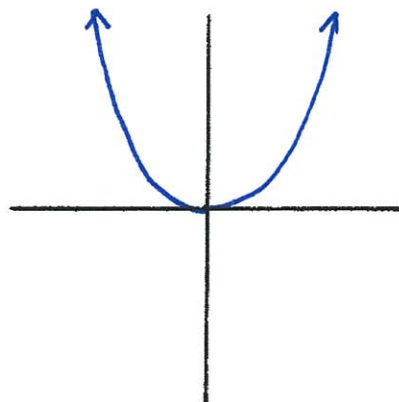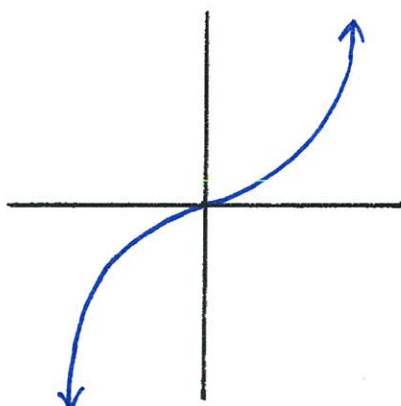
25.)

$$x^5+5x^4y+10x^3y^2+10x^2y^3+5xy^4+y^5$$
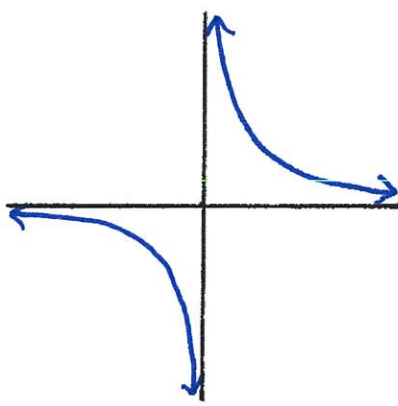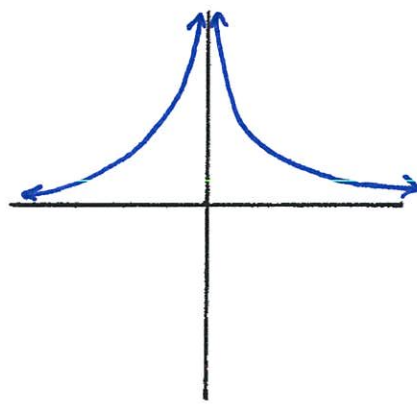
26.) id

27.) $f(x) = -1$
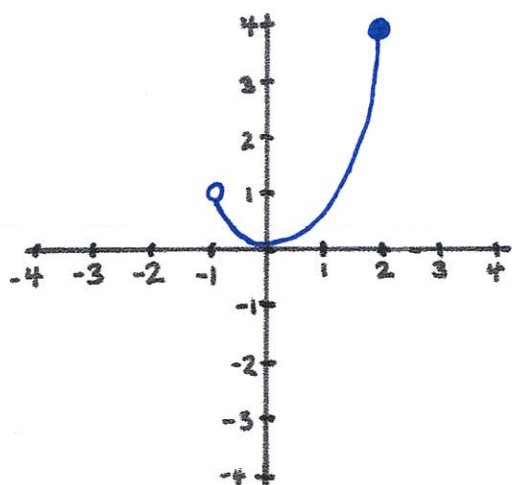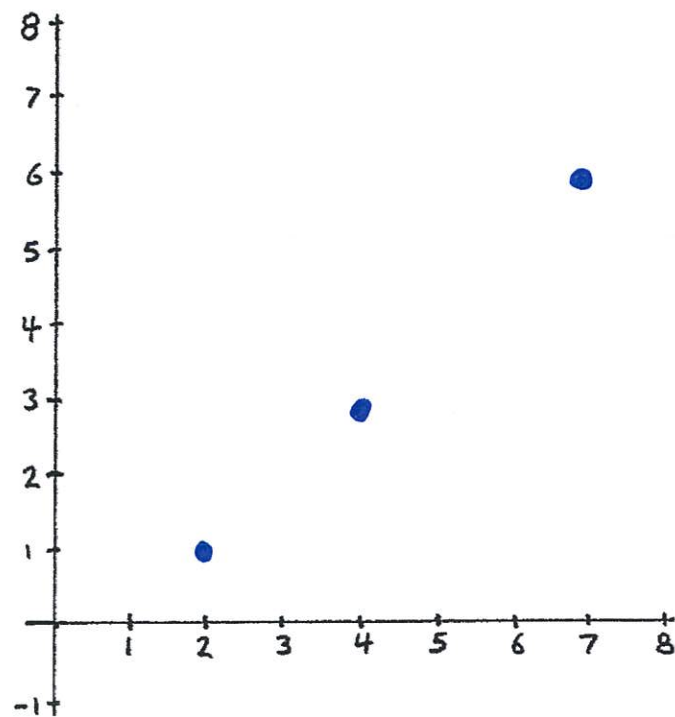
28.) x^2

29.) x^3

30.) $\frac{1}{x}$

31.) $\frac{1}{x^2}$

32.) $g(x)$

33.) $h(x)$

First Practice Exam

For #1-3, decide whether the given sequence is arithmetic, geometric, or neither.

1.) 2, 8, 10, 12, ...   Neither

2.) 3, 7, 12, 18, ...   Neither

3.) 2, -4, -10, -16, ...   Arithmetic

4.) Find $\displaystyle\sum_{i=1}^{3} i^2$

$$1^2 + 2^2 + 3^2 = 1 + 4 + 9 = 14$$

5.) Find $\displaystyle\sum_{i=1}^{50} 3$

$$50(3) = 150$$

6.) Find $\displaystyle\sum_{i=1}^{50} i$

$$\frac{50}{2}\left[1 + 50\right] = 25\left[51\right] = 1{,}275$$

$$\begin{array}{r} 25 \\ 51 \\ \hline 25 \\ 1250 \\ \hline 1{,}275 \end{array}$$

7.) What is the 53rd term in the sequence $3, 12, 48, 192\ldots$?

$$3(4)^{53-1} = 3(4)^{52}$$

8.) What is the 15th term in the sequence $3, 13, 23, 33, \ldots$?

$$3 + 10(15-1) = 3 + 10(14)$$
$$= 3 + 140$$
$$= 143$$

9.) What is the sum of the first 20 terms of the sequence $0, 2, 4, 6, \ldots$?

$$\frac{20}{2}\left[0 + (0 + 19(2))\right] = 10(38) = 380$$

10.) What does the following series equal: $7 + \frac{7}{4} + \frac{7}{16} + \frac{7}{64} + \cdots$?

$$\frac{7}{1 - \frac{1}{4}} = \frac{7}{\frac{3}{4}} = \frac{4}{3} \cdot 7 = \frac{28}{3}$$

11.) A library wants to choose 30 of its 8,000 books to put on a summer reading list. How many ways could the library choose 30 of its books?

$$\binom{8,000}{30}$$

12.) A library has 8,000 books, and it wants to rank its 20 best books, from first to twentieth. How many different rankings are possible?

$$\frac{8,000!}{(8,000-20)!} = \frac{8,000!}{7,980!}$$

13.) A library wants to buy three books: an adventure book, a nonfiction book, and a pamphlet on health issues. The library staff has narrowed its options down to four different choices for which adventure book to buy, five choices for which nonfiction book to buy, and three options for which pamphlet on health issues to buy. How many different different combinations of three books could they buy?

$$(4)(5)(3) = 60$$

14.) A library wants to arrange their 8,000 books in an order. One option is to order the books alphabetically, but how many different ways could they order their books?

$$8,000!$$

15.) What is $\binom{9}{6}$? (Your answer should be a natural number in standard form.)

$$\frac{9!}{6!3!} = \frac{9 \cdot 8 \cdot 7 \cdot 6!}{6! \, 3 \cdot 2} = 3 \cdot 4 \cdot 7 = 84$$

16.) If $f(x) = x^{200} + 3$ and $g(x) = x^{300} + 2$, then what is $f \circ g(x)$?

$$f \circ g(x) = f(g(x))$$
$$= f(x^{300} + 2)$$
$$= (x^{300} + 2)^{200} + 3$$

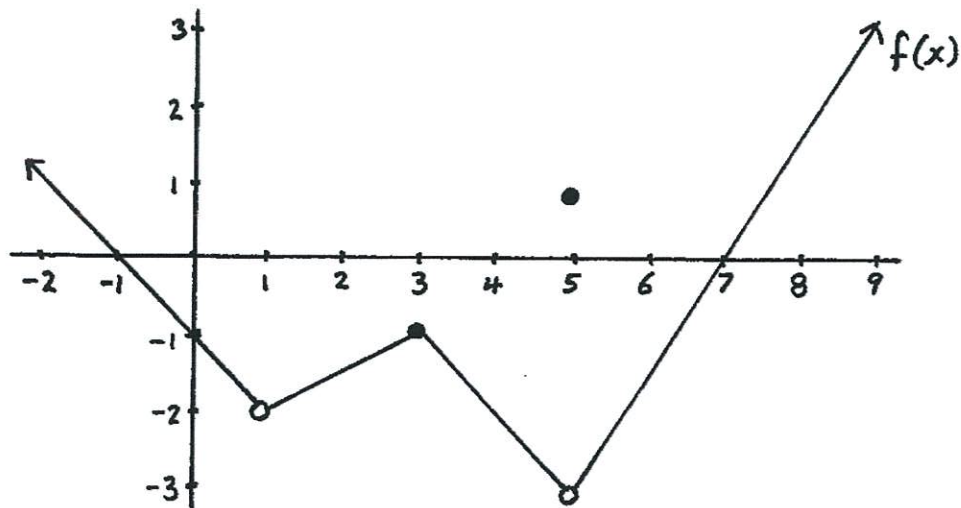17.) What is the implied domain of $f(x) = 5x^3 - 27x$?

$$\mathbb{R}$$

18.) What is the implied domain of

$$g(x) = \frac{2x^2 + 3x - 7}{5x - 7} \ ?$$

$5x - 7 = 0 \implies 5x = 7 \implies x = \frac{7}{5}$

$\mathbb{R} - \{\frac{7}{5}\}$

Below is the graph of a function $f(x)$. Use this graph to answer questions #19-23.
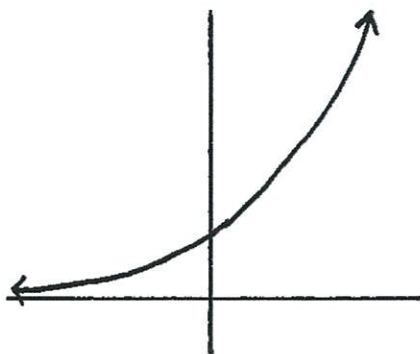

19.) What is $f(5)$? **1**

20.) What is the domain of f? $\mathbb{R} - \{1\}$

21.) What is the range of f? $(-3, \infty)$

22.) What are the x-intercepts of the graph of f? $-1, 7$

23.) What is the y-intercept of the graph of f? -1

24.) Is the picture below the graph of a function?

Yes. It passes the vertical line test.

25.) Write out the product $(x+y)^5$ so that your final answer doesn't include numbers that look like $\binom{n}{k}$.

1
1   1
1   2   1
1   3   3   1
1   4   6   4   1
1   5   10   10   5   1

$$1x^5 + 5x^4y + 10x^3y^2 + 10x^2y^3 + 5xy^4 + y^5$$

26.) Graph id.

27.) Graph $f(x) = -1$.

28.) Graph x^2.

29.) Graph x^3.

30.) Graph $\frac{1}{x}$.

31.) Graph $\frac{1}{x^2}$.

32.) Graph $g : (-1, 2] \to \mathbb{R}$ where $g(x) = x^2$.

33.) Graph $h : \{2, 4, 7\} \to \mathbb{R}$ where $h(x) = x - 1$.

$h(2) = 2 - 1 = 1 \implies (2, 1)$ is a point in the graph
$h(4) = 4 - 1 = 3 \implies (4, 3)$ is a point in the graph
$h(7) = 7 - 1 = 6 \implies (7, 6)$ is a point in the graph.