Math 1050-006 Practice Final Exam

1.) Find 3 things that are wrong with the following statement:

$$[2,5] \in (2,1)$$

2.) If the function f: $\mathbb{Q} \rightarrow \mathbb{R}$ is defined as $f(x) = x^2 + 2x$ then:

   a) What set does the object x belong to?

   b) What is f(3)?

   c) What is f(π)?

3.) If $a_1, a_2, a_3, \ldots = -3, 1, 5, \ldots$ then what is the 80th term in this sequence, a_{80}?

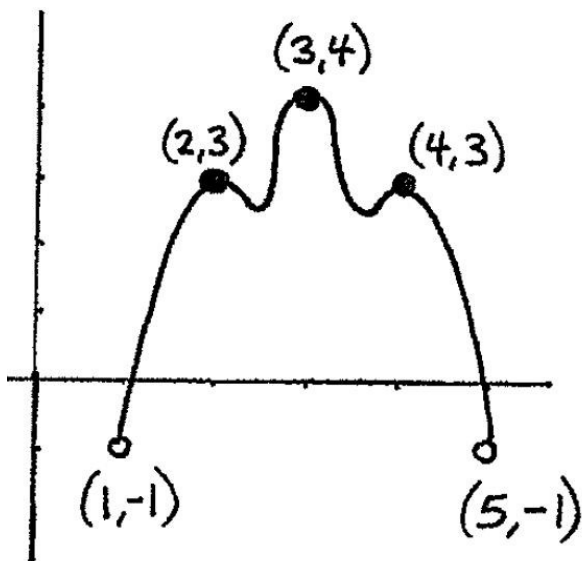4.) What is $\sum_{k=1}^{20} (k\text{-}3)$?

5.) How many different ways can you arrange the 6 letters a,b,c,d,e,f into 'words'?
(for example: bacdef is a 'word')

6.) Write out Pascal's triangle to the row n=4 and use the Binomial theorem and Pascal's Triangle to factor out $(x+y)^4$

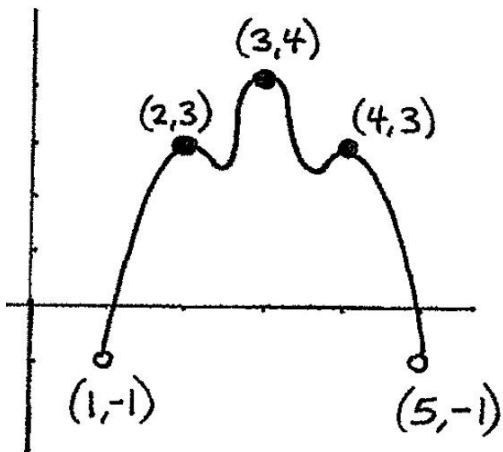7.) If $h(x) = x^2 + x$ and $g(x) = x-2$ solve for:
a) $g \circ h(x)$

b) $h \circ g(x)$
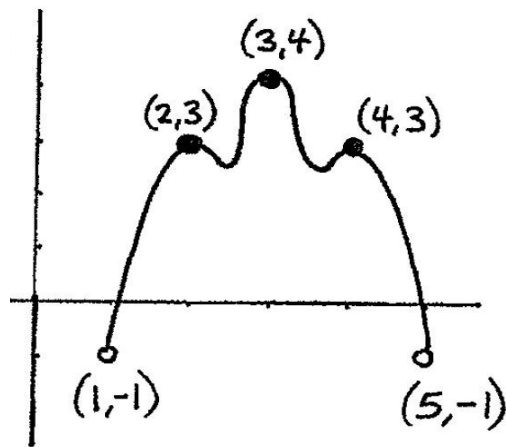
8.) Find the domain and range of the following graph:

9.) Given the graph from problem 8 of g(x), graph h(x) = g(x+2) and j(x) = - g(x) using graph transformations

a) h(x)

(3,4)
(2,3) (4,3)
(1,-1) (5,-1)

b) j(x)

(3,4)
(2,3) (4,3)
(1,-1) (5,-1)
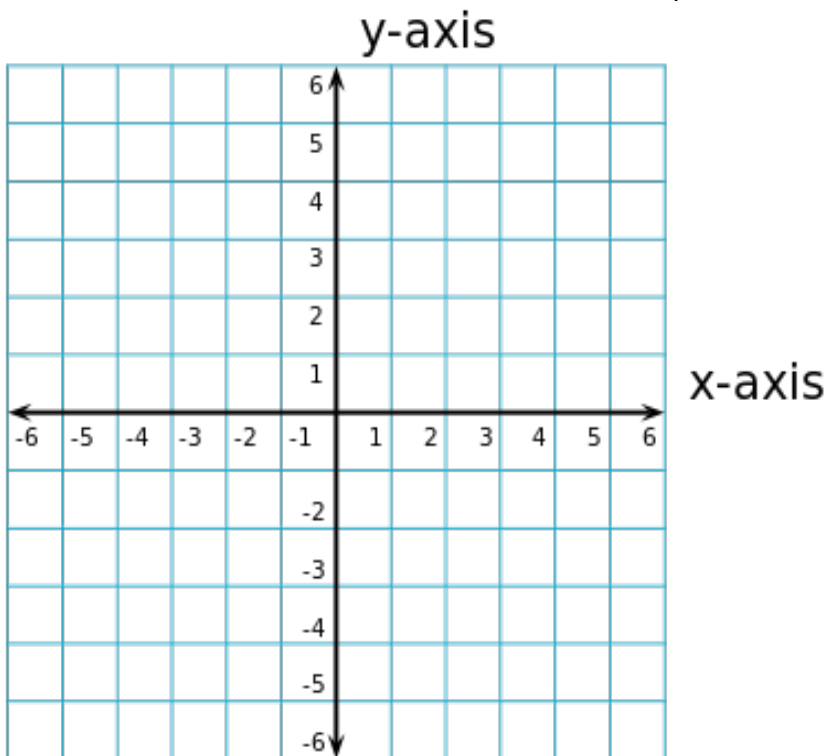
10.) if f:$\mathbb{R} \to \mathbb{R}$ and f(x) = 3x-4 using the ideas of one-to-one and onto decide whether or not f(x) has an inverse function

11.) If $g(x) = \dfrac{(2x-4)}{(x+3)}$, find $g^{-1}(x)$. (*Assuming the implied domain* $x \neq -3$)

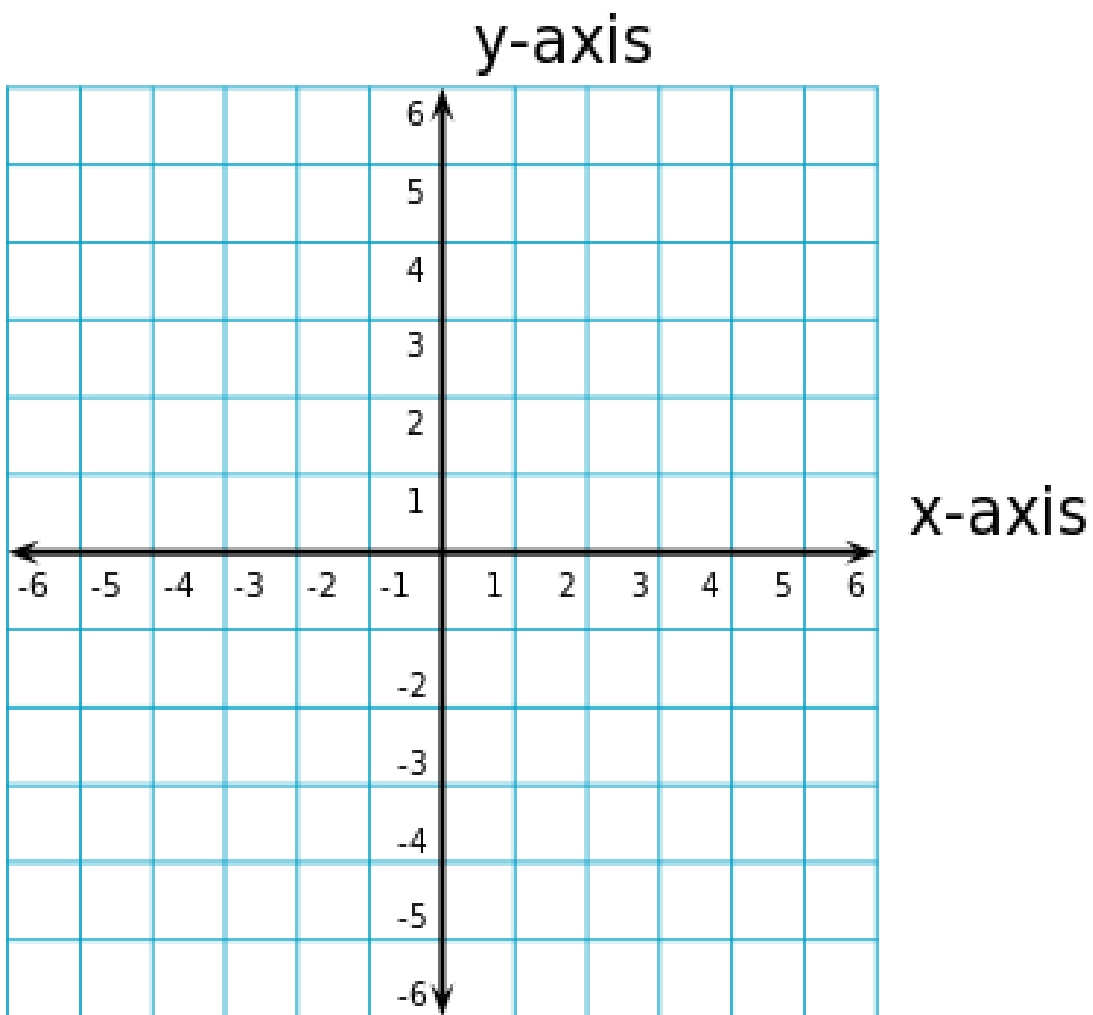12.) What is the implied domain of the function $f(x) = 3\sqrt[6]{-2x+4}$?

13.) Solve $\dfrac{(2x^3-4x^2+5x-7)}{2x-4}$ express your answer with the remainder if you find one.

14.) Graph the linear polynomial function $p(x) = \dfrac{1}{4}x - 5$.

y-axis

x-axis

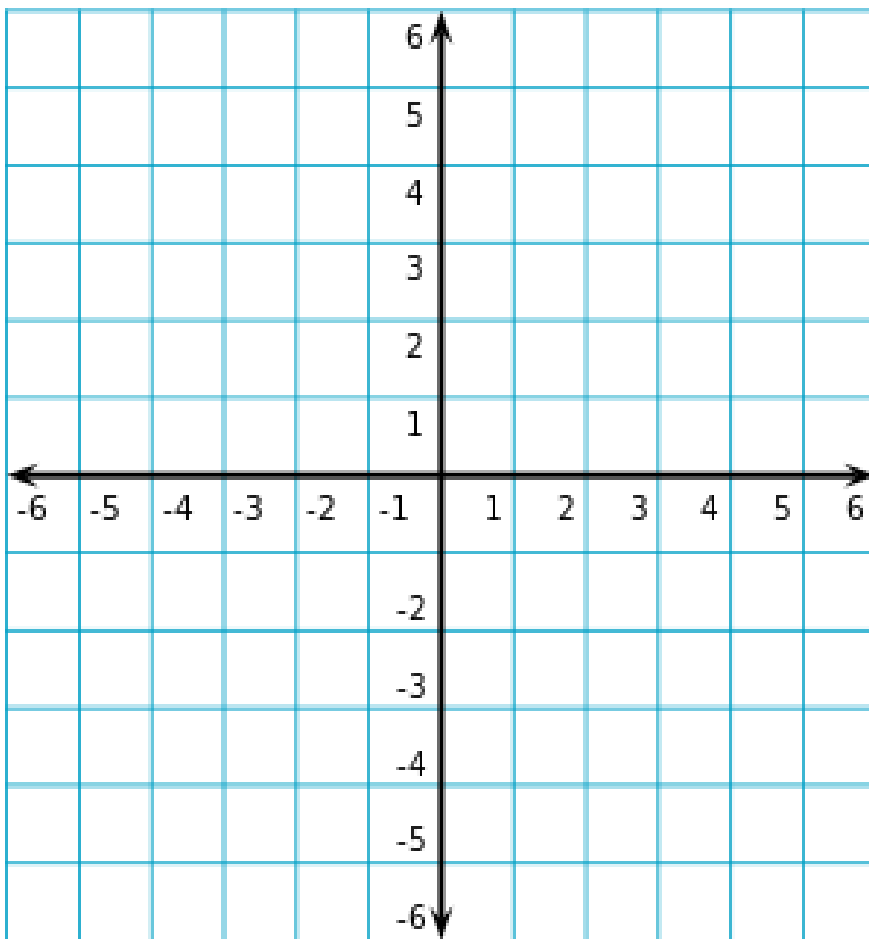15.) By completing the square (formula: $p(x)=a(x+\dfrac{b}{2a})^2+c-\dfrac{b^2}{4a}$)

Graph the quadratic polynomial $p(x)=2x^2+4x-5$

16.) Completely factor the polynomial $p(x) = 2x^3 + 6x^2 + 2x + 6$

17.) Graph the exponential function $f(x) = \left(\dfrac{1}{3}\right)^{(x-2)}$
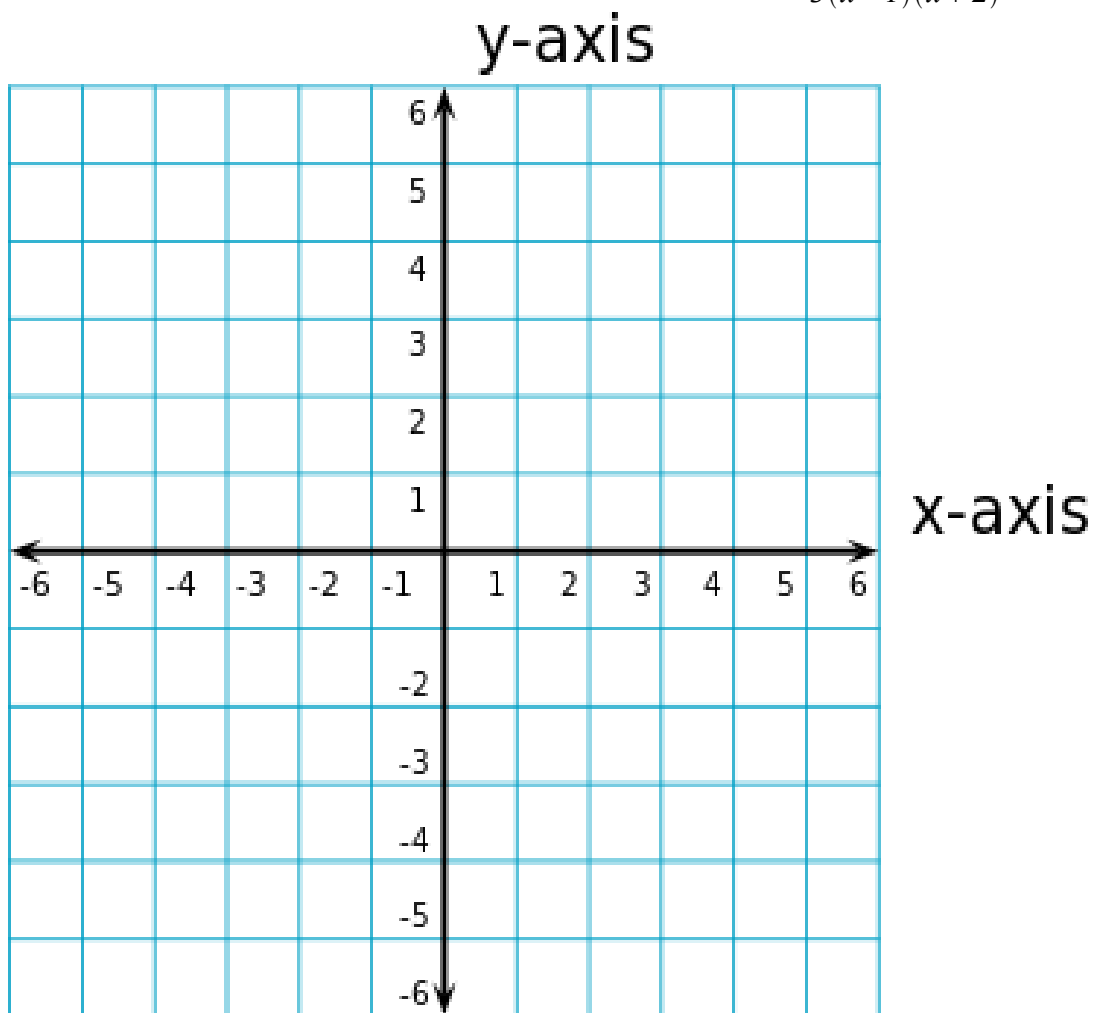
y-axis

x-axis

18.) Find the vertical assymptotes, x-intercepts, and the leading order term of the rational function

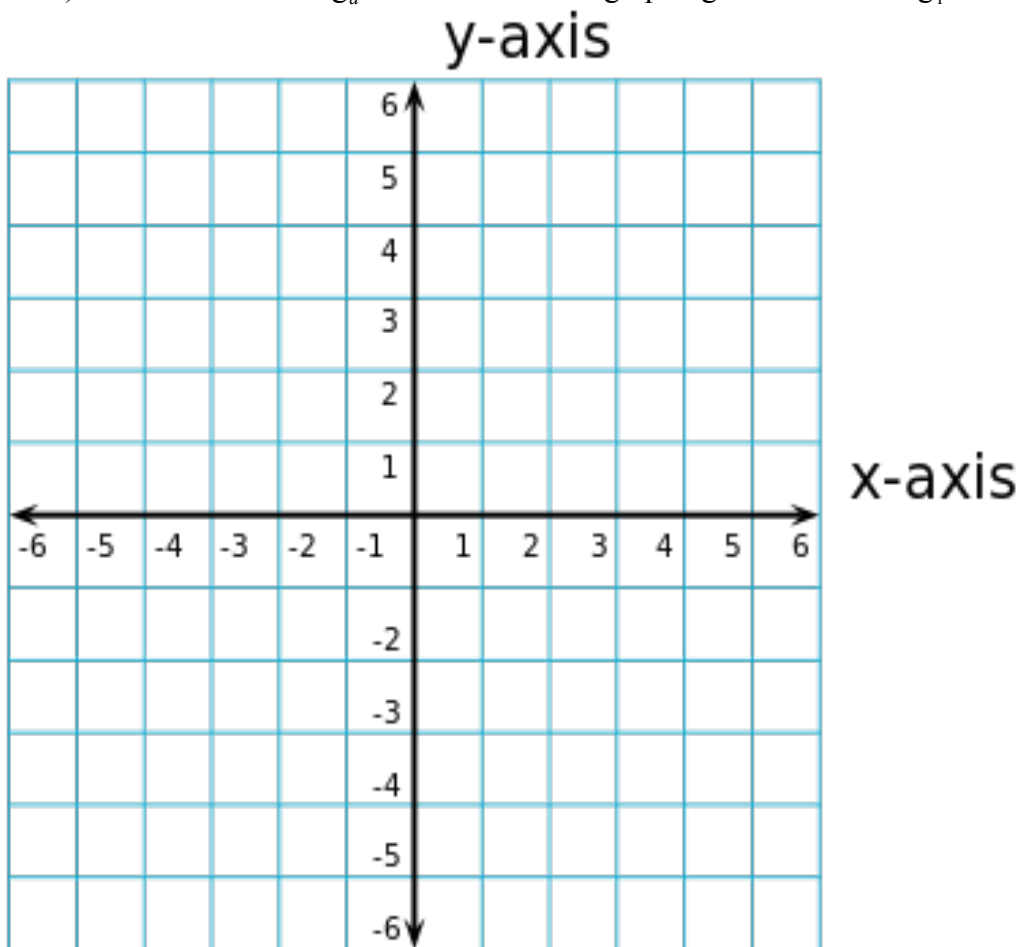$$r(x) = \frac{(x+4)(x-3)(x^2+1)}{3(x-1)(x+2)}$$

19.) Using your solutions from problem 18, graph $r(x) = \frac{(x+4)(x-3)(x^2+1)}{3(x-1)(x+2)}$

y-axis

x-axis

20.) Solve the logarithmic equation: $\log_3((x+2)^3)+\log_3(9)=5$ for x

21.) Solve the exponential equation: $e^x e^{(3x-4)}=4$ for x

22.) Use that a^x and $\log_a x$ are inverses and graphing to show that $\log_1 x$ is not a function

23.) If g(x) is a peicewise defined function with g(x)= $\begin{cases} 2^x & \text{if } x\in(-\infty, 2) \\ -x & \text{if } x\in(3,5] \\ -3 & \text{if } x\in(5,\infty) \end{cases}$
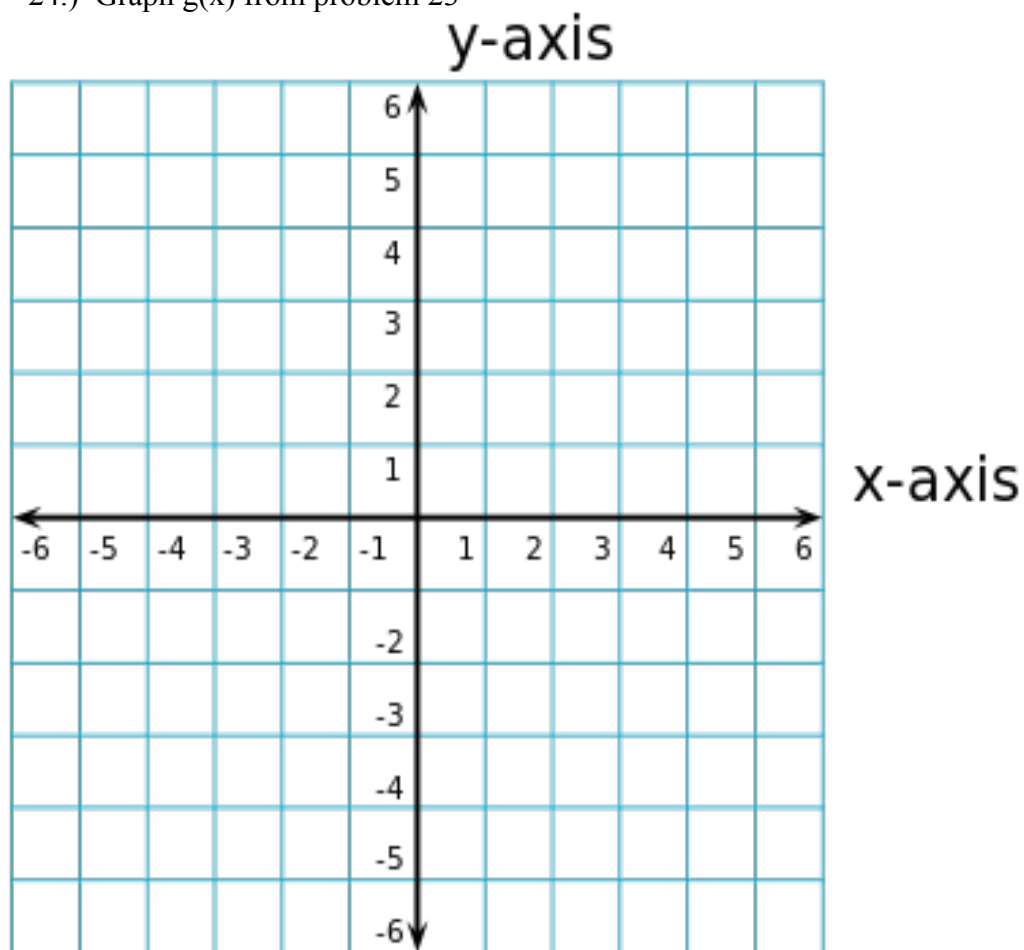
then evaluate the following if able, and if not possible write undefined and state why

a) g(0)

b) g(2.5)

c) g(6)

24.) Graph g(x) from problem 23

y-axis

x-axis

25.) Solve the following system of equations for x and y.

$$2x + 4y = 7$$
$$3x - 2y = -5$$

26.) Is $x=1, y=2, z=3$ a solution to the system of three linear equations of three variables

$$x + y + z = 6$$
$$2x - y + 3z = 9$$
$$-x + y - z = -2$$

27.) Find the product of $(1, 3, 2, 0) \begin{pmatrix} -2 \\ 4 \\ -1 \\ 7 \end{pmatrix}$

28.) Find $2\begin{pmatrix} 2 \\ -1 \\ 5 \end{pmatrix} + 3\begin{pmatrix} 1 \\ 2 \\ -4 \end{pmatrix}$

29.) Find $\begin{bmatrix} 1 & -2 \\ 3 & 0 \end{bmatrix}\begin{bmatrix} 3 & 2 \\ -2 & 4 \end{bmatrix}$

30.) Find $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} -2 & 1 & 7 \\ 5 & -1 & 4 \\ -2 & 4 & 0 \end{bmatrix}$

31.) Find the inverse of the matrix $\begin{bmatrix} 2 & 3 \\ -1 & 1 \end{bmatrix}$

32.) Given that $\begin{bmatrix} 3 & -1 & -1 \\ 8 & 10 & 3 \\ 2 & 3 & 1 \end{bmatrix}^{-1} = \begin{bmatrix} 1 & -2 & 7 \\ -2 & 5 & -17 \\ 4 & -11 & 38 \end{bmatrix}$ find solutions to the system

of linear equations of 3 variables:

$$3x - y \quad -z = 3$$
$$8x + 10y + 3z = 2$$
$$2x + 3y \quad + z = 1$$