

SOLUTIONS FALL FINAL EXAM REVIEW

$$(1.) y = -\frac{4}{7}x + 15$$

$$(2.) g(x) = \frac{x^2 - 5}{2x} ; g(n-3) = \frac{(n-3)^2 - 5}{2(n-3)}$$

$$= \frac{(n^2 - 6n + 9) - 5}{2n - 6}$$

$$= \boxed{\frac{n^2 - 6n + 4}{2n - 6}}$$

$$(3.) C(x) = \frac{1.75x + 500}{x}$$

$$C(100) = \frac{1.75(100) + 500}{100} = \frac{175 + 500}{100} = \frac{675}{100} = \boxed{\$6.75}$$

$$(4.) f(x) = \sqrt{4x + 7}$$

$$4x + 7 \geq 0$$

$$4x \geq -7$$

$$\boxed{x \geq -\frac{7}{4}}$$

5.) $f(x) = x^3 - 12x + 6$

r. min $(2, -10)$ r. max $(-2, 22)$

6.) right 5, up 3

7.) $f(x) = 2 - 5x$ $g(x) = 4x - 2$

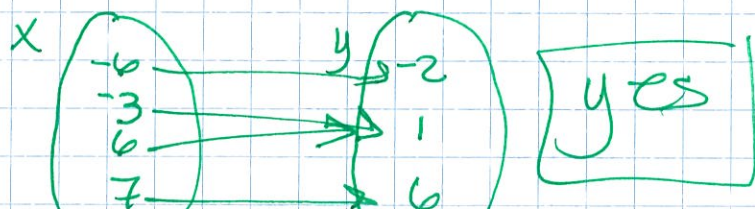
a.) $(g \circ f)(x) = g(f(x)) = g(2 - 5x) = 4(2 - 5x) - 2$
 $= 8 - 20x - 2$
 $= \boxed{6 - 20x}$

b.) $f(g(x)) = f(4x - 2) = 2 - 5(4x - 2)$
 $= 2 - 20x + 10$
 $= \boxed{12 - 20x}$

8.) c.) $y = -8x^2$

9.) B.) $\{(-1, -3), (-3, -1), (1, 1)\}$

10.) $\{(-6, -2), (-3, 1), (6, 1), (7, 6)\}$



$$(11.) f(x) = 3x^2 - \sqrt{2x} \quad ; \quad f(9)$$

$$f(9) = 3(9)^2 - \sqrt{2(9)}$$

$$= 243 - \sqrt{18}$$

$$= 243 - 3\sqrt{2} \approx 238.757$$

$$(12.) h(x) = \frac{5x}{x(x^2 - 36)}$$

$$x(x^2 - 36) = 0$$

$$x=0 \quad x^2 - 36 = 0 \\ x^2 = 36 \\ x = \pm 6$$

$$D: \mathbb{R}, x \neq 0, \pm 6$$

$$(13.) (f+g)(x) \text{ and } (f+g)(4)$$

$$f(x) = x^2 - 2x - 5 \quad g(x) = -1 - 4x + 5x^2$$

$$(f+g)(x) = 6x^2 - 6x - 6$$

$$(f+g)(4) = 6(4)^2 - 6(4) - 6 \\ = 6(16) - 24 - 6$$

$$= 66$$

$$(14.) f(x) = |2x| \quad g(x) = 5x$$

$$(f \circ g)(x) = f(g(x)) = f(5x) = |2(5x)| = |10x| = 10|x|$$

15. $f(x) = \{(-5, -8), (-8, -5), (8, -9)\}$

$f^{-1}(x) = \{(-8, -5), (-5, -8), (-9, 8)\}$

16. $x=0$ for 1989

L1	L2
0	36.25
1	34.75
2	34.5
3	36.5
4	37.75
5	39
6	40.25
7	40.5

STAT → CALC → 4: LinReg

$y = 0.857x + 34.438$

17. opens upward → lead coefficient positive

A) $16x + 11$ linear

B) $f(x) = 8x^2 + 9$

C) $f(x) = -9(25x^2 - 90x + 81)$

$= -225x^2 + 810x - 729$

d) $f(x) = -9x^2 + 24$

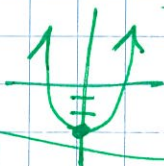
$$\begin{array}{r|l} & -5x + 9 \\ -5x & 25x^2 - 45x \\ 9 & -45x \quad 81 \\ & 25x^2 - 90x + 81 \end{array}$$

18. $f(x) = x^2 - 3$

$y = x^2$ down 3

[A]

[B]



[C]

[D]

19.) $f(x) = x^2 + 2x - 3$
 $= (x-1)(x+3)$

Zeros: $x-1=0$ $x+3=0$
 $x=1$ $x=-3$
 $(1,0)$ $(-3,0)$

vertex:

$$x = -b/2a$$

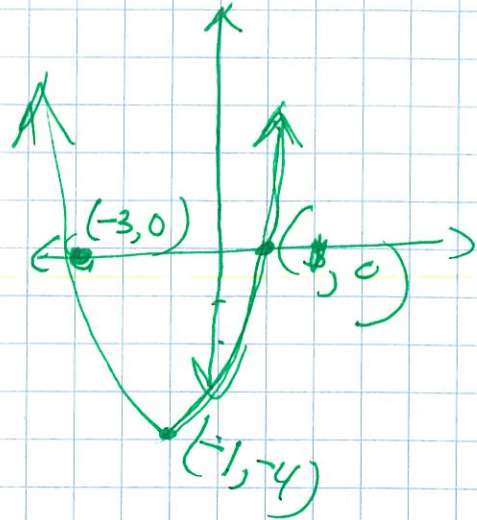
$$x = -2/2 = -1$$

$$y = (-1)^2 + 2(-1) - 3$$

$$= 1 - 2 - 3$$

$$= -4$$

Vertex: $(-1, -4)$



20.) $f(x) = -8x - 7 - 2x^2$ → put into calculator
 $y_1 = -8x - 7 - 2x^2$
 $f(x) = -2x^2 - 8x - 7$

2nd CALL TRACE → 4: maximum

$(-2, 1)$

21.) $P = -x^2 + 6x + 1$
 find max in calculator

(3000,)

22.) vertex (1,1) point (0,0) (2,0)

$$y = a(x-h)^2 + k$$

$$y = a(x-1)^2 + 1$$

plug in (0,0)

$$0 = a(0-1)^2 + 1$$

$$0 = a(-1)^2 + 1$$

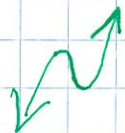
$$0 = 1a + 1$$

$$a = -1$$

$$y = -1(x-1)^2 + 1$$

~~y = 1~~

23.) 1, 3, -1 → zeros



positive-a ~~power~~ degree odd
lead coeff.

24.) (x+2) factor
-2 is the zero

$$\begin{array}{r} -2 \overline{) \begin{array}{r} 3 \quad -8 \quad -33 \quad -10 \\ \downarrow \quad -6 \quad 28 \quad 10 \\ \hline 3 \quad -14 \quad -5 \quad 0 \end{array}} \end{array}$$

$$3x^2 - 14x - 5 = 0$$

$$\left. \begin{array}{l} (3x^2 - 15x) + (x - 5) \\ 3x(x-5) + 1(x-5) \end{array} \right\}$$

$$(3x+1)(x-5) = 0$$

$$3x+1=0 \quad x-5=0$$

$$3x = -1$$

$$x = -\frac{1}{3}$$

$$x = 5$$

$$\begin{array}{r} \cancel{-15} \\ \cancel{-15} \quad 1 \\ \cancel{-14} \end{array}$$

$$(3x+1)(x-5)(x+2)$$

25. $-12i + 4i^2$
 $-12i + 4(-1)$
 $-12i - 4$
 $\boxed{-4 - 12i}$

26. Find all the zeros of the function.

$$f(x) = x^4 + 4x^3 - 4x^2 - 36x - 45$$

use rule to find "real" zeros

~~3~~ $\boxed{+3}$

$$\begin{array}{r|rrrrr} 3 & 1 & 4 & -4 & -36 & -45 \\ & \downarrow & 3 & 21 & 51 & 45 \\ \hline & 1 & 7 & 17 & 15 & 0 \\ -3 & & \downarrow & -3 & -12 & -15 \\ \hline & 1 & 4 & 5 & 0 & \end{array}$$

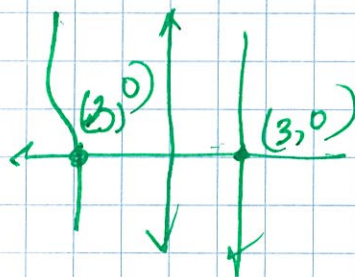
$$x^2 + 4x + 5 = 0$$

$$x = \frac{-4 \pm \sqrt{16 - 4(1)(5)}}{2(1)}$$

$$= \frac{-4 \pm \sqrt{-4}}{2}$$

$$= \frac{-4 \pm 2i}{2}$$

$$= \boxed{-2 \pm i}$$



Quad Form

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Zeros : $\boxed{\pm 3, 2 \pm i}$
 (there are 4)

27. $f(x) = \frac{(x-1)}{(x-8)(x+6)}$

Set denom. = to 0

$x-8=0$ $x+6=0$
 $x=8$ $x=-6$

$D: \mathbb{R}, x \neq -6, 8$

28. HA \rightarrow $n=m$ (ratio of coefficients)
 $y = \frac{3}{4}$

29. VA \rightarrow set denom. = to 0

$x^2 + 3x - 4 = 0$
 $(x+4)(x-1) = 0$

$x+4=0$ $x-1=0$
 $x=-4$ $x=1$

VA: $x = -4$ $x = 1$

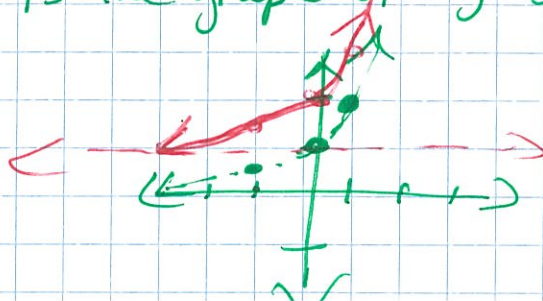
30. find $f(x)$ when $t=5$

$f(x) = 720(0.83)^5$

$f(x) = 284 \text{ animals}$

31. $f(x) = 2^x + 1$

is the graph of $y = 2^x$ shifted up 1

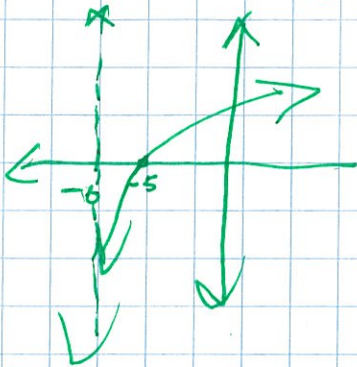


x	2^x	
0	$2^0 = 1$	(0, 1)
1	$2^1 = 2$	(1, 2)
-1	$2^{-1} = \frac{1}{2}$	(-1, $\frac{1}{2}$)

} shift up

$$(32.) f(x) = \log_2(x+6)$$

is the graph of $y = \log_2 x$ shifted left 6



$$(33.) \log_8 \frac{x^6}{\sqrt[3]{y}} = \log_8 x^6 - \log_8 \sqrt[3]{y}$$
$$= \log_8 x - \frac{1}{3} \log_8 y$$

$$(34.) 6e^{0.04x} + 41 = 71$$

$$6e^{0.04x} = 30$$

$$e^{0.04x} = 5$$

$$\ln e^{0.04x} = \ln 5$$

$$0.04x = \ln 5$$

$$x = \frac{\ln 5}{0.04}$$

$$x \approx 40.24$$

$$(36.) \log_2(x+3) - \log_2 x = 3$$

$$\log_2 \left(\frac{x+3}{x} \right) = 3$$

$$2^3 = \frac{x+3}{x}$$

$$8 = \frac{x+3}{x}$$

$$8x = x+3$$

$$7x = 3$$

$$x = \frac{3}{7}$$

$$(35.) \log_6(4x+3) = 4$$

$$6^4 = 4x+3$$

$$1296 = 4x+3$$

$$1293 = 4x$$

$$\frac{1293}{4} = x$$

$$(37.) \quad 5 \ln(6x) = 11$$

$$\ln(6x) = \frac{11}{5}$$

$$\log_e 6x = \frac{11}{5}$$

$$e^{\frac{11}{5}} = 6x$$

$$\frac{e^{\frac{11}{5}}}{6} = x$$

$$x \approx 1.504$$

$$(38.) \quad 215,000 = 57,000 \ln(6t + 7)$$

$$\frac{215,000}{57,000} = \ln(6t + 7)$$

$$\frac{215}{57} = \ln(6t + 7)$$

$$\frac{215}{57} = \log_e(6t + 7)$$

$$e^{\frac{215}{57}} = 6t + 7$$

$$e^{\frac{215}{57}} - 7 = 6t$$

$$\frac{e^{\frac{215}{57}} - 7}{6} = t$$

$$t \approx 6.077 \text{ years}$$

$$(39.) \quad (A.)$$

40.) STAT → CALC → 0: ExpReg

$$y = 0,584(1,511)^x$$

41.) $\begin{bmatrix} 1 & 2 & 8 \\ 1 & 1 & 3 \end{bmatrix} \xrightarrow{\text{rref}} \begin{bmatrix} 1 & 0 & -2 \\ 0 & 1 & 5 \end{bmatrix}$
(-2, 5)

42.) ~~text~~ $\begin{bmatrix} 6 & 6 & 42 \\ 3 & -6 & 3 \end{bmatrix} \xrightarrow{\text{rref}} \begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & 2 \end{bmatrix}$
(5, 2)

43.) $\begin{bmatrix} -7 & -7 & -1 & -5 \\ 0 & 9 & 1 & 5 \\ 0 & 0 & 1 & 4 \end{bmatrix} \xrightarrow{\text{rref}} \begin{bmatrix} 1 & 0 & 0 & \frac{2}{63} \\ 0 & 1 & 0 & \frac{1}{9} \\ 0 & 0 & 1 & 4 \end{bmatrix}$
($\frac{2}{63}, \frac{1}{9}, 4$)

44.) $\begin{bmatrix} 4 & -3 & -2 & 6 \\ 5 & -5 & -1 & -12 \\ 3 & -3 & 2 & -2 \end{bmatrix} \xrightarrow{\text{rref}} \begin{bmatrix} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & 2 \end{bmatrix}$
(4, 6, 2)

45.) rows x columns

$$\boxed{4 \times 2}$$

46.) A

47.) $4A - 7B$ use calc. $\begin{bmatrix} 4 & -27 & -69 \\ -44 & 58 & 7 \\ 63 & 68 & -54 \end{bmatrix}$

~~$4A = \begin{bmatrix} 4 & 8 & -26 \end{bmatrix}$~~

48.) use calc

$[A]^{-1} \rightarrow$ use x^{-1} button

DNE

49.) $\begin{matrix} 2^{nd} \\ \boxed{\text{MATRIX}} \\ \boxed{x^{-1}} \end{matrix} \rightarrow \text{MATH} \rightarrow 1: \text{det}$

$\boxed{3}$

50.) AB use calc $\begin{bmatrix} -3 & -5 \\ 2 & -11 \end{bmatrix}$