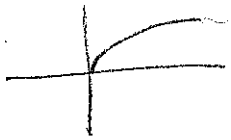
ALG 2 – SHORT ANSWER

1. 

D $(0, \infty)$
R $(0, \infty)$

2. $2\sqrt[3]{(x+1)^2} + 1 = 21$

$$\frac{2\sqrt[3]{(x+1)^2}}{2} = \frac{20}{2}$$

$$\left(\sqrt[3]{(x+1)^2}\right)^3 = (10)^3$$

$$(x+1)^2 = 1000$$

$$x^2 + 2x + 1 = 1000$$

$$x^2 + 2x + -999 = 0$$

$$\frac{-2 \pm \sqrt{4 - 4(-999)}}{2}$$

$$\frac{-2 \pm \sqrt{4.000}}{2}$$

$$\frac{-2 \pm 63.25}{2}$$

30.625, −32.625

*3. USE GR. CALC OR

$$3 = x + \sqrt{-11-3x}$$
$$-x \quad -x$$

$$(3-x)^2 = \left(\sqrt{-11-3x}\right)^2$$

$(3-x)(3-x)$

$$9 + 6x + x^2 = -11 - 3x$$

$$x^2 - 6x + 9 = -11 - 3x$$
$$+3x \quad +11 \quad +11 \quad +3x$$

$$x^2 - 3x + 20 = 0$$

$(x \quad)(x \quad)$

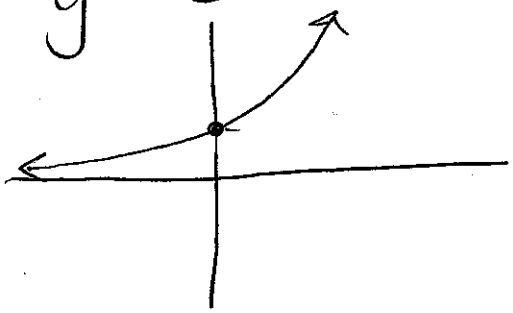
$$\frac{+3 \pm \sqrt{9 - 4(1)(20)}}{2}$$

$$\frac{3 \pm \sqrt{-71}}{2}$$

NO REAL SOLUTIONS

IMAGINARY $\dfrac{3 \pm \sqrt{-71}}{2}$

4. $y = 2e^{x-1}$



y-int @ $(0, 0.736)$

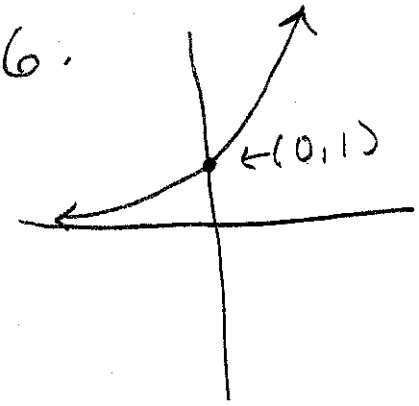
5. Domain $h \geq 0$ OR $[0, \infty)$ ← Because Altitude must not be negative

Range $0 < P \leq 101.3$ OR $(0, 101.3]$

LOOK on CALCULATOR

ALG 2 S.A.

6.



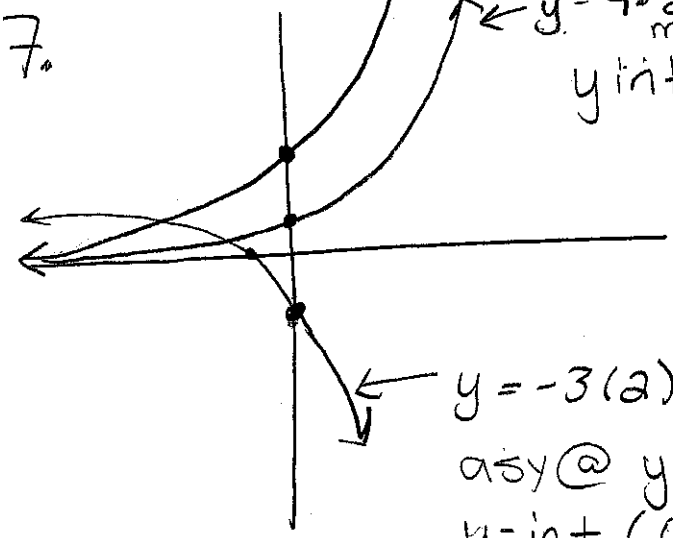
DOMAIN $(-\infty, \infty)$ All reals

RANGE $(0, \infty)$ EXPONENTIAL

y-int $(0,1)$

max A

7.



$y = 4 \cdot 2^x$ y-int $(0,4)$

$y = 4 \cdot 2^{(x-3)}$ moved 3 to the right

y int: $(0, \frac{1}{2})$

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

asy @ $y = 1$

y-int $(0, 2)$

x-int $(-1.585, 0)$

8. $y = 6\left(\frac{1}{3}\right)^x$ decay % decrease $(1 - \frac{1}{3}) = \frac{2}{3} = 66.7\%$

$y = 2(1.75)^x$ growth % increase $(1.75 - 1) = 75\%$

$y = 9(0.80)^x$ decay % decrease $(1 - 0.8) = 0.2 = 20\%$

9. $y = a(b)^x$

$b > 1$ growth

$0 < b < 1$ decay

a is the y-int
the initial value

10. $y = ab^x$

$= 250(1-0.03)^x$

$= 250(1-0.03)^5$

$= 214.6$

$= 215$

11. $y = ab^x$

$= 12{,}000(1-25\%)^x$

$= 12{,}000(.75)^n$

12) $A = Pe^{rt}$

A = Amt after t years
P = principal (initial amount
r = annual percentage rate
t = time in years

Alg 2 SA

13. $A = Pe^{rt}$

$A = 4000e^{(0.03)(6)}$

$A = \$4788.87$

14. USE GR.CALC OR

$3^{4x+1} = 9^{x+3}$

$3^{4x+1} = (3^2)^{x+3}$

$3^{4x+1} = 3^{2x+6}$ so... → $4x+1 = 2x+6$

$2x = 5$

$x = \frac{5}{2}$

$3^{4(\frac{5}{2})+1} = 177147$ $\left(\frac{5}{2}, 177147\right)$

15. $\frac{64}{2} = \frac{2(1.4)^{x+1}}{2}$

$32 = (1.4)^{(x+1)}$

$\log_{1.4} 32 = x+1$

$\frac{\log 32}{\log 1.4} = x+1$ → $\frac{1.505}{0.146} = x+1$

$10.308 = x+1$

$-1 \quad -1$

$9.308 = x$

16. $\ln 50 = 3.9 \rightarrow e^{3.9} = 50$

$\log_2\left(\frac{1}{8}\right) = -3 \quad 2^{-3} = \frac{1}{8}$

$\log_a b = x \quad a^x = b$

17. $64 = 2^y \quad \log_2 64 = y$

18. $\log 5 - \log 50 = 3x$

$\log \frac{5}{50} = 3x$

$\log 0.1 = 3x$

$-1 = 3x$

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

19. $\log_2 x = 7$

$2^7 = x$

$128 = x$

$\log_3 150 = x$

$\frac{\log 150}{\log 3} = x$

$\frac{2.176}{0.477} = x$

$4.562 = x$

Alg 2 SA

20. $y = a\,b^x$

$y = a\left(\frac{1}{2}\right)^t$

$y = 200\left(\frac{1}{2}\right)^{\frac{100}{13}}$

$y = 200\left(\frac{1}{2}\right)^{7.69}$

$y = 0.97$ grams

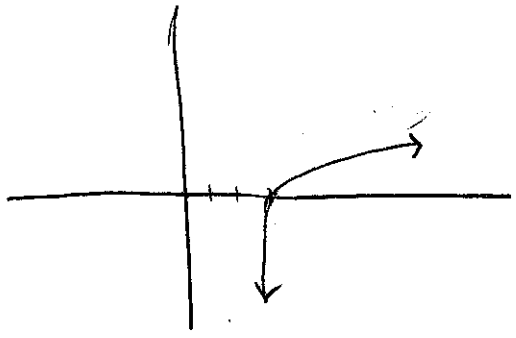
21. Logarithm $\log_b x = f(x)$ ← inverse... not the original rewritten

$y = b^x$

$x = b^y$ switch x & y to find inverse

$\log_b x = y$

22.



D $(3, \infty)$

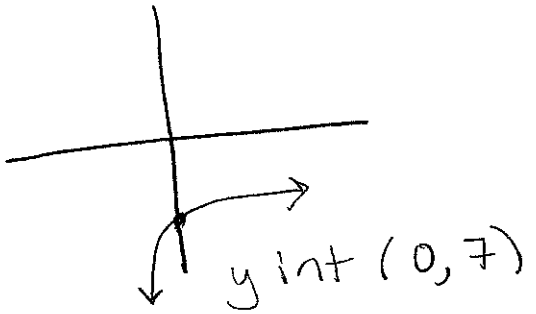
R $(-\infty, \infty)$

$\log(x-3)+2$

$\rightarrow 3 \quad \uparrow 2$

23. $y = \log(x+1) - 7$

$\leftarrow 1 \quad \downarrow 7$

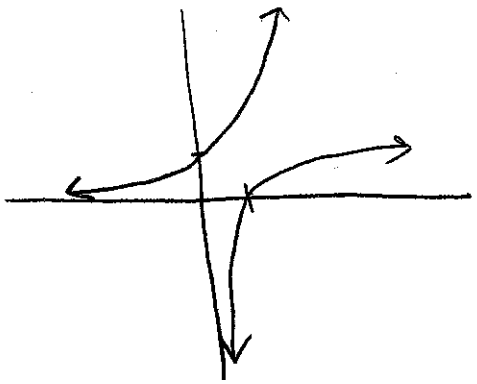


D $(-1, \infty)$

R $(-\infty, \infty)$

24. $f(x) = \ln x$

$y = \ln x \quad e^y = x$ so inverse switches x & y $\quad e^x = y$



$y = \ln x$

D $(0, \infty)$

R $(-\infty, \infty)$

y int none

x int (1,0)

$y = e^x$

D $(-\infty, \infty)$

R $(0, \infty)$

y int (1,0)

x int none

Alg 2 - SA

Trig.

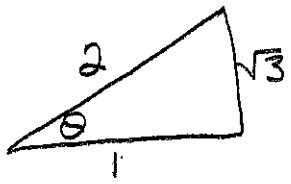
25. $\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + \left(-\frac{1}{2}\right)^2 = 1$

$\sqrt{\sin^2\theta} = \sqrt{\frac{3}{4}}$ $\pm$

$\theta = \frac{\sqrt{3}}{2}$

OR



$1^2 + y^2 = 2^2$

$y^2 = 3$

$y = \sqrt{3}$

$\sin\theta = \frac{\sqrt{3}}{2}$

Based on question we need to have positive sin

26.

$1250 - 360 = 890$

$890 - 360 = 530$

$530 - 360 = 170°$

$1250 - 360 - 360 - 360 = -190°$

$\frac{13\pi}{4} - 2\pi = \frac{5\pi}{4}$

$\frac{13\pi}{4} - 2\pi = \frac{5\pi}{4} - 2\pi = -\frac{3\pi}{4}$

27. $y = \underline{50} \sin \underline{3}x + \underline{1}$

Amp = 50

period $\frac{2\pi}{3}$

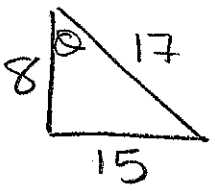
vertical translation ↑ 1

28. $y = 0.001 \sin(880\pi\Theta)$

D $(-\infty, \infty)$ all reals

RANGE $[-0.001, 0.001]$ $-0.001 \leq y \leq 0.001$

29. $\cos\Theta = \frac{8}{17}$



$15^2 + y^2 = 17^2$

$225 + y^2 = 289$

$y^2 = 64$

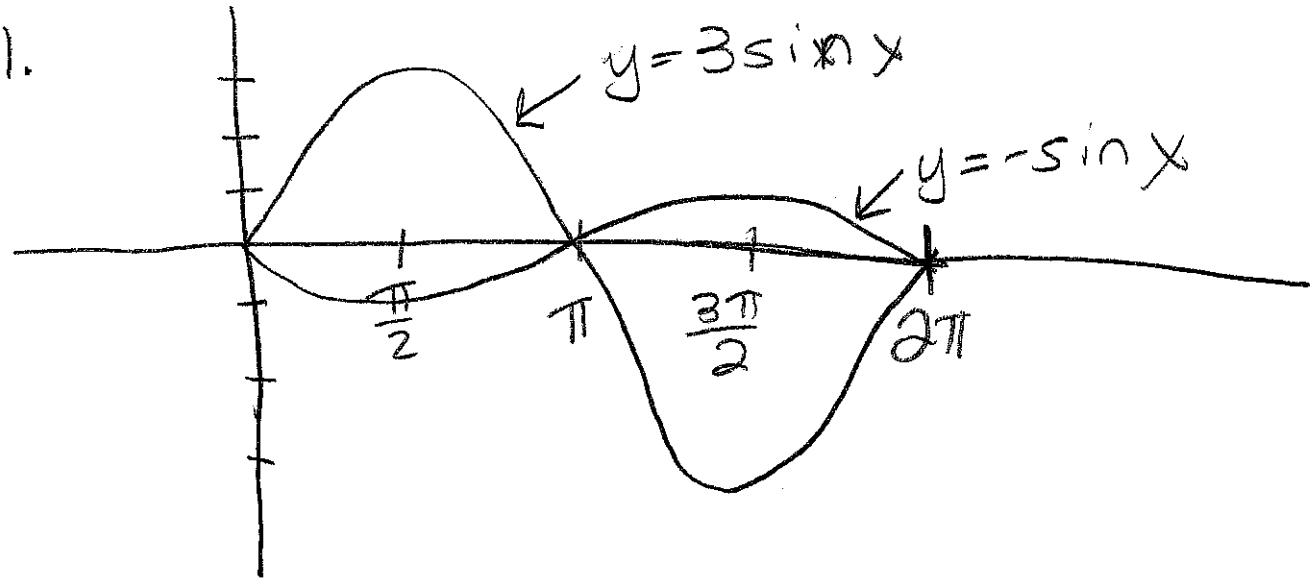
$y = 8$

30. $\frac{180°}{\pi} = \frac{120°}{x}$

$\frac{120\pi}{180} = \frac{180x}{180}$ $\frac{12}{18} = \frac{2}{3}$

$\frac{2\pi}{3} = x$

31.



the a valve is what causes the differences

32. D = all reals range = $-4 \le y \le 6$

Period π $y = 5\sin(2x) + 1$

amp = 5

33. $\frac{-\sqrt{3}}{2}$, $\frac{\sqrt{3}}{2}$, 1

34. $\frac{12}{30} \cdot \frac{11}{29} = \frac{132}{870} = 0.1517$

35. $\frac{3}{6} \cdot \frac{1}{2} = \frac{1}{4}$ $\quad \frac{2}{6} \cdot \frac{1}{2} = \frac{1}{6}$

36. (1) 2 (3) 4 (5) 6 (7) 8 (9) 10

$\frac{6}{10} = \frac{3}{5}$ OR $\frac{5}{10} + \frac{3}{10} - \frac{2}{10}$

$\frac{8}{10} - \frac{2}{10}$

$\frac{6}{10} = \frac{3}{5}$

37.

	M	F	
> 5	150	200	350
< 5	100	50	150
	250	250	500

a) $\frac{350}{500} = \frac{35}{50} = \frac{7}{10}$

b) $\frac{50}{500} = \frac{1}{10}$

c) $\frac{350}{500} + \frac{250}{500} - \frac{150}{500} = \frac{450}{500} = \frac{45}{50}\ \frac{9}{10}$

or $350+100 = \frac{450}{500} = \frac{9}{10}$

d & e on next page

Alg 2 SA

37 cont

P(>5 | female)

$\frac{200}{250} = \frac{20}{25} = \frac{4}{5}$

P(male | >5 hrs)

$\frac{150}{350} = \frac{15}{35} = \frac{3}{7}$

38. Arithmetic

Recursive $a_1 = 8 \quad a_n = a_{n-1} + 4$

Explicit $a_n = 8 + 4(n-1)$

$8 + 4n - 4$

$4n + 4$

$a_{50} = 4(50) + 4$

$a_{50} = 204$

terms 1-10 $\frac{n}{2}(a_1 + a_n)$

$a_{10} = 4(10) + 4$

44

$\frac{10}{2}(8 + 44)$

$5(52)$

260

39. Geometric

recursive $a_1 = -1$

$a_n = a_{n-1} * -3$

explicit $a_n = -1(-3)^{n-1}$

$a_{14} = -1(-3)^{13}$

$= 1,594,323$

sum $a_1\left(\frac{1-r^n}{1-r}\right)$

$-1\left(\frac{1-(-3)^9}{1--3}\right)$

$-1\left(\frac{1--19683}{4}\right)$

-4921

40.

6
8
10
12
14

EXPLICIT
Arithmetic

$a_n = 14 + -2(n-1)$

$a_n = 14 + 2n + 2$

$a_n = 2n + 16$

41.

200	300	450	675	1012.5	1518.75	2278.125
200	500	950	1625	2637.5	4156.25	6434.375

Geo $r = 1.5$

*

3417.187	5125.78125	7688.67187		
9851.562	14,977.3432			

9th summer

$a_n = 200(1.5)^{n-1}$

$a_9 = 200(1.5)^{9-1}$

$= 5125.78125$

sum $= a_1\left(\frac{1-r^n}{1-r}\right)$

$10{,}000 = 200\left(\frac{1-(1.5)^n}{1-1.5}\right)$

$\frac{10000}{200} = \frac{200\left(\frac{1-1.5^n}{-0.5}\right)}{200}$

$50 = \frac{1-1.5^n}{-0.5}$

$-25 = 1 - 1.5^n$

$-26 = -1.5^n$

$26 = 1.5^n$ →

$$26 = 1.5^n$$

$$\log 26 = \log 1.5^n$$

$$\frac{\log 26}{\log 1.5} = \frac{n \log 1.5}{\log 1.5}$$

$$\frac{1.41497}{0.17609} = n$$

$$8.035 = n$$

So, this happens in year 9.