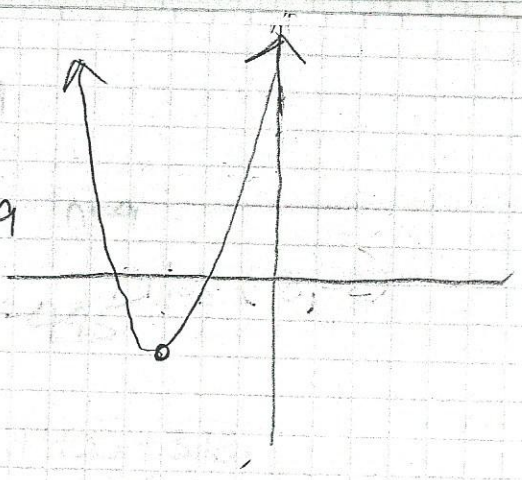
10-40) a) $f(x) = x^2 + 6x + 7$

$f(x) = (x^2 + 6x + 9) + 7 - 9$

$f(x) \quad (x+3)^2 - 2$

vertex $(-3, -2)$

y-int $(0, 7)$



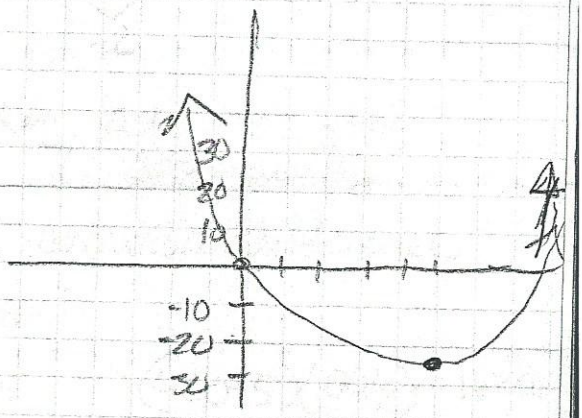
b) $f(x) = x^2 - 10x$

$f(x) = (x^2 - 10x + 25) - 25$

$f(x) = (x-5)^2 - 25$

vertex $= (5, -25)$

y-int $= (0, 0)$



10-42) a) $45 = \boxed{\frac{\pi}{4}}$ b) $\frac{75}{360} = \frac{x}{2\pi}$ $x = \frac{150\pi}{360} = \boxed{\frac{5\pi}{12}}$

c) $\frac{-15}{360} = \frac{x}{2\pi}$ $\frac{-30\pi}{360} = x = \boxed{\frac{-\pi}{12}}$

d) $\frac{450}{360} = \frac{x}{2\pi}$ $\frac{900\pi}{360} = x = \frac{10\pi}{4} = \boxed{\frac{5\pi}{2}}$

Thurs 5/14 10.1.3 (10-49 → 10-57) Delete 52

10-49) a) $5 = \frac{400-5}{n-1}$ $5n - 5 = 395$ $5n = 400$ $n = 80$

$(5+400)\,80/2 = \boxed{16200}$

b) $5 = \frac{398-3}{n-1}$ $5n - 5 = 395$ $5n = 400$ $n = 80$ $(3+398)\left(\frac{80}{2}\right) = \boxed{16040}$

c) $-6 = \frac{14-80}{n-1}$ $-6n + 6 = -66$ $-6n = -72$ $n = 12$ $(80+14)\left(\frac{12}{2}\right) = \boxed{564}$

10-50) $11+22+33+\ldots 99$

$\frac{99-11}{n-1} = 11 \quad 88 = 11n-11 \quad \frac{99}{11} = \frac{11n}{11} \quad n=9$

Sum $= (99+11)(9/2) = 495$

10-51) a) $5+3+10+8+15+\ldots+400+398.$

$-2 \quad +7 \quad -2 \quad +7 \qquad -2$

Terms decrease by 2 then add 7, then decrease by 2 then add 7 continually

b) Yes, there is not a common difference

c) Find the sum of each

① $5 = \frac{400-5}{n-1} \quad 5n-5 = 395 \quad 5n = 400 \quad n = 80 \quad (400+5)(80/2) = 16200$

② $5 = \frac{398-3}{n-1} \quad 5n-5 = 395 \quad 5n = 400 \quad n = 80 \quad (3+398)(80/2) = 16040$

Total sum $= 16200 + 16040 = 32240$

10-53) $x^2-6x+11=0$

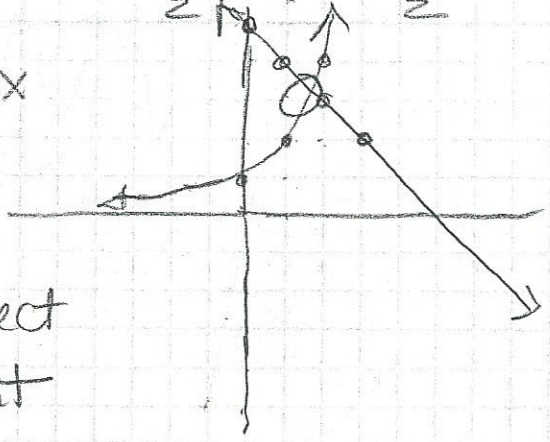
$\frac{6 \pm \sqrt{36-4(1)(11)}}{2} = \frac{6 \pm \sqrt{36-44}}{2}$

$\frac{6 \pm \sqrt{-8}}{2} = \frac{6 \pm 2i\sqrt{2}}{2} = 3 \pm i\sqrt{2}$ ✓

10-54) $2^x = 5-x$

$y = 2^x$

$y = -x+5$



2^x	
x	y
0	1
1	2
2	4

only intersect @ one point

10-55) $4n + 2m = 13.50$
$-2(3n + 1m = 9.25)$

$3(2.5) + m = 9.25$

$m = 9.25 - 7.50$

$\boxed{m = \$1.75}$

$4n + 2m = 13.50$
$-6n - 2m = -18.50$

$-2n = -5$

$\boxed{n = \$2.50}$

10-56) a) $\log_7(3x-2) = 2$

$7^2 = 3x - 2$
$49 = 3x - 2$
$51 = 3x$
$\boxed{17 = x}$

b) $2^x \cdot 2^{x-2} - 16^2 = 0$

$2^{x+x-2} = 16^2$

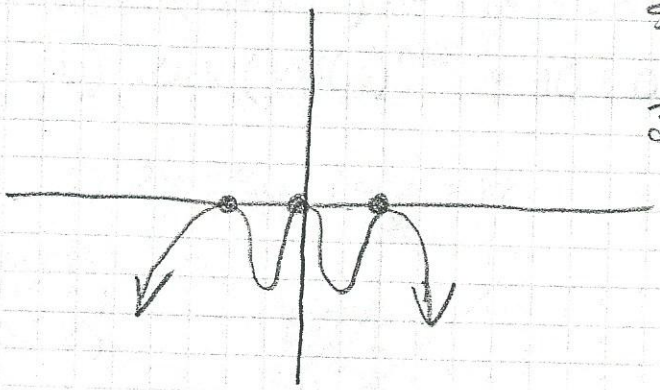
$2^{2x-2} = 2^{4 \cdot 2}$

$2x - 2 = 8$
$2x = 10$
$\boxed{x = 5}$

10-57) $y = -x^2(x-2)^2(x+2)^2$

degree = 6
start ↓ end down

3 double roots



Friday 5/15 10.1.4 (10-62 → 10-70) delete 66 & 67

10-62) a) $\frac{-83-47}{n-1} = -13$

$-130 = -13n + 13$

$-143 = -13n$

$11 = n$

$47 - 13(k-1)$

$60 - 13k$

$\sum_{k=1}^{11} 60 - 13k = -198$

$(47 + -83)(\frac{11}{2}) = -198$

b) $\sum_{k=1}^{n} -4 + 7k = \frac{7(n-1)n}{2}$

$(3 + 7(n-1) + 3)(\frac{n}{2}) = (3 + 7n - 7 + 3)\frac{n}{2} = \frac{(7n-1)n}{2}$

10-63) series $100 + 101 + 102 \ldots 1000$

$\frac{1000-100}{n-1} = 1$ $\quad (1000+100)(\frac{901}{2}) = 495550$

$900 = n-1$ Use arithmetic series

$901 = n$

10-64)

1: $1+1+41 = 43$

2: $4+2+41 = 47$

3: $9+3+41 = 53$

Actually only works for integers 1 through 39

10-65) a) $3(7 \cdot 3^{n-1}) = 7 \cdot 3^1 \cdot 3^{n-1} = 7 \cdot 3^{n-1+1} = \boxed{7 \cdot 3^n}$

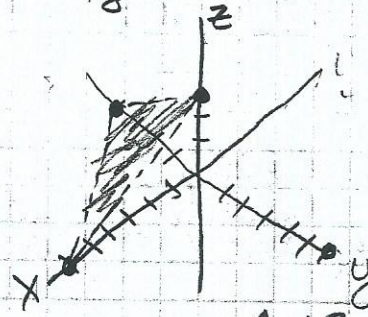
b) $0.6(10)(.6)^{n-2} = 10 \cdot 0.6^{1+n-2} = \boxed{10(0.6)^{n-1}}$

10-68) a) $2x - 3y + 4z = 12$ Find intercepts

$(6, 0, 0)$

$(0, -4, 0)$

$(0, 0, 3)$

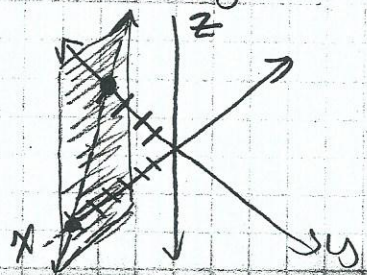


b) $2x - 3y = 12$

$(6, 0, 0)$

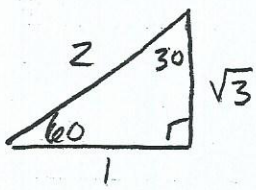
$(0, -4, 0)$

$(0, 0, 0)$



10-69) $\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

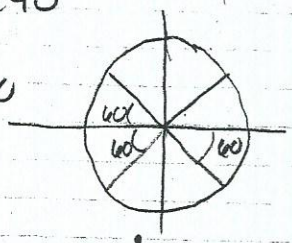
$\frac{\pi}{3} = 60$



$\frac{2\pi}{3} = 120°$

$\frac{4\pi}{3} = 240$

$\frac{5\pi}{3} = 300$

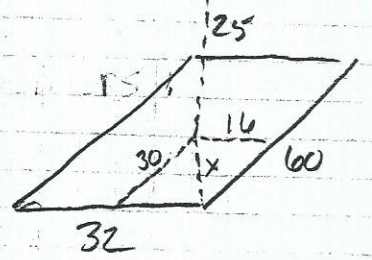


$\cos\frac{2\pi}{3} = -\frac{1}{2}$

$\cos\frac{4\pi}{3} = -\frac{1}{2}$

$\cos\frac{5\pi}{3} = \frac{1}{2}$

10-70) a)



$x^2 = 16^2 + 30^2$

$x^2 = 1156$

$x = 34$

corners: $34^2 + 25^2 = c^2$

$1156 + 625 = c^2$

$1781 = c^2$

$42.2 = c$

$4(42.2) = 168.80$

$2(39) = 78$

$2(30) = 60$

306.8 ft

2 middles: $30^2 + 25^2 = m^2$

$900 + 625 = m^2$

$1525 = m^2$

$39 = m$

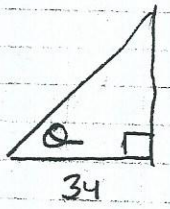
2 middles: $16^2 + 25^2 = m^2$

$256 + 625 = m^2$

$881 \quad m^2$

$30 = m$

b)



$\tan^{-1}\frac{25}{34} = \theta = 36.3°$

c) $4\sqrt{x^2+34^2} + 2\sqrt{x^2+30^2} + 2\sqrt{x^2+16^2}$

$4\sqrt{x^2+1156} + 2\sqrt{x^2+900} + 2\sqrt{x^2+256}$

Tues/Wed 5/19 & 5/20 10.2.1 (10-87 → 104) delete 91, 98

10-87) $t(n) = 3 \cdot 10^{n-1}$

a) $3 + 30 + 300 + 3000 + 30,000 + 300,000 = 333,333$

b) Write the series $3 + 30 + \ldots + 300,000 = S(6)$ Twice

Multiply one by 10 $30 + 300 + \ldots 3,000,000 = 10(S(6))$

Subtract $-(3 + 30 + 300 + \ldots 300,000 = S(6))$

$\frac{2,999,997}{9} = \frac{9(S(6))}{9}$

$S(6) = 333,333$

c) $\sum_{i=1}^{n} 3 \cdot 10^{n-1} = \frac{3 \cdot 10^n - 3}{9}$

$\frac{ar^n - a}{1-r}$

10-88) a) A sequence would represent the list of the sizes of the graduating classes as the number of years since the school opened increased.

The series would represent the growing number of alumni.

b) $t(n) = 42 + 12(n-1)$

1st Term = 42

Last Term

$t(10) = 42 + 12(10-1)$

$42 + 12(9)$

$42 + 108$

$t(10) = 150$

Sum $= (150 + 42)\left(\frac{10}{2}\right)$

$= 960$ total

c) $t(n) = 42 + 12n - 12$

$= 30 + 12n$

$t(1) = 42$

Total $= (42 + 30 + 12n)\left(\frac{n}{2}\right) = \frac{42n}{2} + \frac{30n}{2} + \frac{12n^2}{2}$

$21n + 15n + 6n^2$

$= 36n + 6n^2$

10-89) $8 + 1 + (-6) + (-13) + \ldots + (-90)$

a) Common difference $= -7$

$t(n) = 8 - 7(n-1)$ **$n = 15$**

$-90 = 8 - 7(n-1)$

$-90 = 8 - 7n + 7$

$-90 = 15 - 7n$

$-105 = -7n$

$\frac{-105}{-7} = \frac{-7n}{-7}$

$15 = n$

b) Sum $= (-90 + 8)\left(\frac{15}{2}\right) = -82\left(\frac{15}{2}\right) =$ **-615**

10-90) $\sum_{n=3}^{9} (5n)$

last term $= 9(5) = 45$

1st term $= 5(3) = 15$

$= 7$ terms $\quad (45+15)\left(\frac{7}{2}\right) =$ **210**

↑ careful - Not 6

arithmetic

10-91) a) ${}_{23}P_3 = \frac{23!}{(23-3)!} = 10,626$

b) ${}_{23}C_3 = \frac{23!}{(23-3)! \cdot 3!} = 1771$

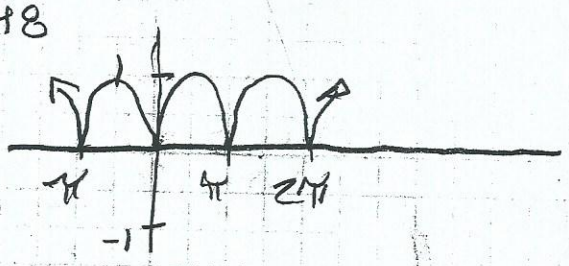
c) $1 \cdot 22 \cdot 22 = 484$

d) $4 \cdot 22 \cdot 22 = 1848$

10-92) $y = \sin x$

$y = |\sin x|$

all values positive



10-93) a) $\frac{x^2-4}{x^2+4x+4} = \frac{(x-2)(x+2)}{(x+2)(x+2)} = \frac{x-2}{x+2}$

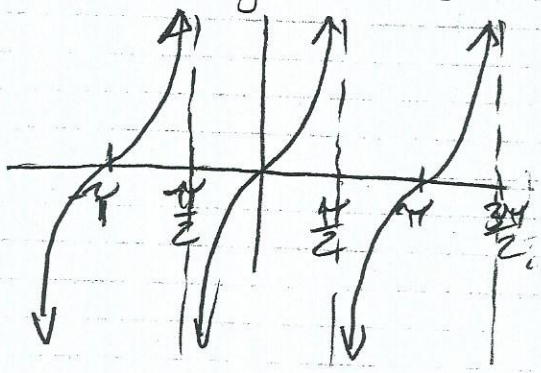
b) $\frac{2x^2-5x-3}{4x^2+4x+1}$ $\quad AC = -6$, $-6 \cdot 1$

$\frac{2x^2-6x+1x-3}{(2x+1)(2x+1)} = \frac{2x(x-3)+1(x-3)}{(2x+1)(2x+1)} = \frac{(2x+1)(x-3)}{(2x+1)(2x+1)}$

$\boxed{\frac{x-3}{2x+1}}$

c) Use distributive property to factor and multiplicative property of 1 to reduce

10-94) a) $y = \tan(x)$



No amplitude
period = π
locator = $(0,0)$

b) $y = -\tan(x-\pi)$

No amplitude
period = π
locator = $(\pi, 0)$

Full shift of one period so graph is the same

10-95) a) $\log_5(2x) = 3$

$5^3 = 2x$

$125 = 2x$

$\boxed{125/2 = x}$

b) $\log_5(x+1) = -1$

$5^{-1} = x+1$

$\frac{1}{5} = x+1$

$.2 = x+1$

$\boxed{-.8 = x}$

c) $\log(4) - \log(x) = 2$

$\log \frac{4}{x} = 2$

$10^2 = 4/x$

$100 = \frac{4}{x}$

$100x = 4$

$x = \frac{4}{100} = \boxed{.04}$

d) $2\log_3(6) + \log_3(y) = 4$

$\log_3(6^2)(y) = 4$

$3^4 = 36y$

$81 = 36y$

$\frac{81}{36} = y = \boxed{\frac{9}{4}}$