

FALL Semester Review Solutions

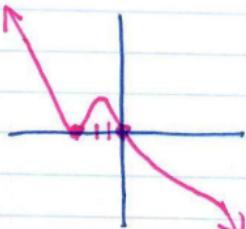
UNIT 1

POLY-nomials

$$\textcircled{1} \quad y = -x(x+3)^2$$

-LC
odd degree

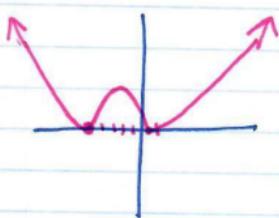
zeros: $\begin{array}{c|cc} 0 & | & -3 \\ \text{cross} & & \text{touch} \end{array}$



$$\textcircled{2} \quad y = (2x-1)^2(x+5)^2$$

+LC
even degree

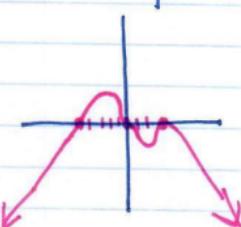
zeros: $\begin{array}{c|cc} 1/2 & | & -5 \\ \text{touch} & & \text{touch} \end{array}$



$$\textcircled{3} \quad y = -x^3(x-3)^2(x+5)$$

-LC
even degree ✓

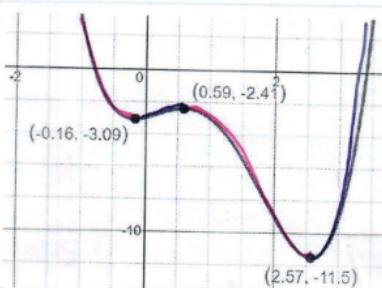
zeros: $\begin{array}{c|cc|c} 0 & | & 3 & | -5 \\ \text{wiggles} & \text{touch} & \text{cross} \end{array}$



$$\textcircled{4} \quad \begin{array}{r} 2 \ 1 \ 2 \ 1 \ 0 \ -1 \ 2 \\ \downarrow \ 4 \ 10 \ 20 \ 38 \\ 2 \ 5 \ 10 \ 19 \ 40 \end{array}$$

remainder: $\boxed{40}$

$\textcircled{5}$



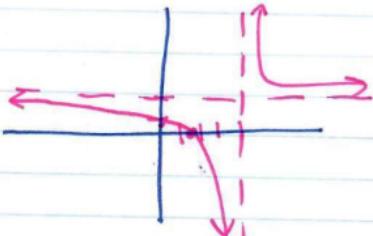
extrema: mins: $-3.09 @ x = -0.16$
 $-11.5 @ x = 2.57$
 max: $-2.41 @ x = 0.59$

increasing: $(-\infty, -0.16) \cup (0.59, \infty)$
 decreasing: $(-0.16, 0.59) \cup (2.57, \infty)$

(unit 3)

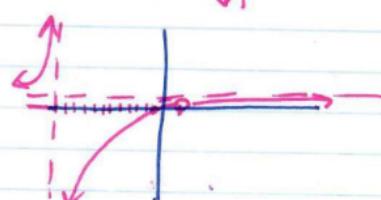
Unit 2 Rationals ⑥ $\frac{2x-3}{x-4}$

HA: $y=2$
 VA: $x=4$
 x-int: $(\frac{3}{2}, 0)$
 y-int: $(0, \frac{3}{4})$



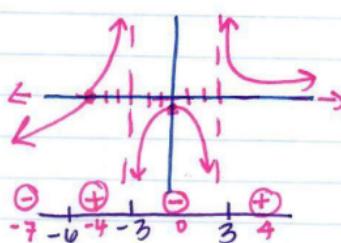
⑦ $\frac{x^2-1}{x^2+11x-12}$

HA: $y=1$
 VA: $x=-12$
 x-int: $(-1, 0)$
 hole: $(1, \frac{2}{13})$



⑧ $\frac{x+6}{x^2-9}$

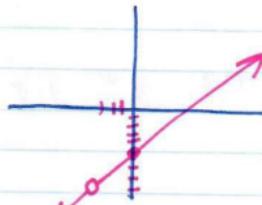
HA: $y=0$
 VA: $x=3, x=-3$
 x-int: $(-6, 0)$
 y-int: $(0, -\frac{2}{3})$



⑨ $\frac{x^2-2x-15}{x+3}$

a lesson →
 in factoring
 FIRST

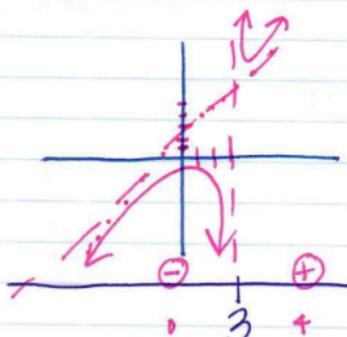
- $\frac{(x+3)(x-5)}{x+3}$... $y=x-5$,
 hole $(-3, -8)$



⑩ $\frac{x^2+1}{x-3}$

HA: none
 Slant: $y=x+3$
 VA: $x=3$
 x-int: none

$\begin{array}{r} 3 | 1 & 0 & 1 \\ & \downarrow 3 & \\ & 1 & 3 \end{array}$



Unit 2

Unit 3

Logs & exponents

$$\textcircled{13} \quad \log_2 25 + \log_4 1 = \frac{\log(25 \cdot 4)}{\log 100} = \boxed{2}$$

$$\textcircled{14} \quad b(\log a + \log b) = \boxed{\log(a \cdot b)^b}$$

$$\textcircled{15} \quad \ln 2x + 3(\ln x + \ln y) = \ln 2x + 3 \left(\ln \left(\frac{x}{y^3} \right) \right) = \boxed{\ln \left(\frac{2x \cdot x^3}{y^3} \right)}$$

$$\textcircled{16} \quad 5^x = \frac{1}{25} \quad \boxed{5^x = 5^{-2}} \quad \boxed{x = -2}$$

$$\textcircled{17} \quad 3^x = 8 \quad \boxed{\log_3 8 = x}$$

$$\textcircled{18} \quad 27^{2x-1} = 9^{x+3} \quad (3^3)^{2x-1} = (3^2)^{x+3}$$

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

$$6x-3 = 2x+6$$

$$4x = 9 \quad \boxed{x = 9/4}$$

$$\textcircled{19} \quad \log_4(3x-2) = 2$$

$$4^2 = 3x-2$$

$$16 = 3x$$

$$\boxed{x = 16/3}$$

$$\textcircled{20} \quad \log_8 x = \frac{2}{3} \quad \textcircled{21} \quad 5 \log_2 (\log_3 81)$$

$$8^{\frac{2}{3}} = x$$

$$(\sqrt[3]{8})^2 = x$$

$$2^2 = x$$

$$\boxed{4} = x$$

$$5 \log_2 (4) = \boxed{10}$$

$$3^{\boxed{4}} = 81$$

$$2^{\boxed{4}} = 16$$

$$\textcircled{22} \quad 5e^x - 12 = 7$$

$$5e^x = 19$$

$$\frac{5}{5} e^x = \frac{19}{5}$$

$$\log_e \left(\frac{19}{5} \right) = x$$

$$\textcircled{23} \quad \ln 1 = \boxed{0}$$

$$\log_e 1 = \boxed{0}$$

$$e^{\boxed{0}} = 1$$

$$\textcircled{11} \quad \text{find domain} \quad \xrightarrow{\text{where denominator} = 0}$$

$$\frac{2}{x^2 - 4x + 3}$$

$$(x-3)(x-1)$$

$$(-\infty, 1) \cup (1, 3) \cup (3, \infty)$$

$$\textcircled{12} \quad \frac{2}{3x^2 - 7x + 6} \quad \text{should be } -$$

$$\begin{array}{r} \cancel{-9} \cancel{x} \cancel{2} \\ \cancel{-7} \end{array} \quad \begin{array}{r} \cancel{-18} \\ \cancel{1} \cancel{18} \\ \cancel{3} \cancel{6} \\ \cancel{2} \cancel{1} \cancel{9} \end{array} \quad \begin{array}{l} (3x^2 - 9x)(2x + 6) \\ 3x(x-3) + 2(x-3) \\ (x-3)(3x+2) \end{array}$$

$$\text{IR, } x \neq 3, -2/3$$

$$24) \ln e^3 \\ 3 \ln e \\ 3(1) = 3$$

$$25) 2 = \log_3(9n+10) \\ 2 = \log_3\left(\frac{9n+10}{5n}\right)$$

$$3^2 = \frac{9n+10}{5n} \\ 45n = 9n + 10 \\ 36n = 10 \\ n = \frac{5}{18}$$

$$26) \ln 5 + \ln(x+2) = \ln 7 \\ \ln(5(x+2)) = \ln 7 \\ 5x+10 = 7 \\ 5x = -3 \\ x = -3/5$$

$$27) \log x + \log(x-9) = 1 \\ \log(x(x-9)) = 1$$

$$10^1 = x^2 - 9x \\ 0 = x^2 - 9x - 10 \\ (x-10)(x+1) \\ \{10, -1\}$$

10

$$28) \text{Find } r. \\ 1 = 2e^{r(420)} \\ \frac{\ln(0.5)}{420} = r \\ r = -0.00165$$

$$y_t = 2e^{-0.00165t(200)}$$

1.43802

$$29) \text{Find } r.$$

$$22400 = 4000e^{r(20)} \\ \frac{\ln(5.6)}{20} = r \\ r = 0.0861$$

$$\text{double: } 8000 = 4000e^{0.0861t}$$

$$\frac{\ln 2}{0.0861} = t$$

8.05 minutes

$$30) \text{compounded daily:} \\ A = 3000 \left(1 + \frac{0.05}{365}\right)^{365 \cdot 10} \\ \$4945.99$$

\$19.13

$$\text{compounded quarterly:} \\ A = 3000 \left(1 + \frac{0.05}{4}\right)^{4 \cdot 10} \\ \$4930.86$$

$$(31) A = Pe^{rt}$$

$$2000 = 1000 e^{0.06t}$$

$$\ln 2 = t$$

11.55 years

Unit 1
Sequences &
Series

$$(32) a_n = n^2 - 3$$

$a_1 = -2$	$1^2 - 3$
$a_2 = 1$	$2^2 - 3$
$a_3 = 6$	$3^2 - 3$
$a_4 = 13$	$4^2 - 3$
$a_5 = 22$	$5^2 - 3$

$$(33) a_n = a_{n-1} + 5 \quad a_1 = 3$$

$a_2 = 8$	$3 + 5$
$a_3 = 13$	$8 + 5$
$a_4 = 18$	$13 + 5$

$$(34) \sum_{x=5}^9 |4-x|$$

$$|4-5| + |4-6| + |4-7| + |4-8| + |4-9|$$

$$1 + 2 + 3 + 4 + 5$$

15

$$(35) \sum_{c=0}^4 (-2)^c$$

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

11

$$(36) -4, -8, -12, -16, -20$$

$$\sum_{n=1}^5 -4 + (-4)(n-1)$$

etc.

$$(37) 12, 3, -6, -15$$

$$\sum_{n=1}^4 12 + (-9)(n-1)$$

etc.

$$(38) 5, 7, 9, 11, 13, \dots$$

$\frac{+2}{+2}$

arithmetic

$$a=5$$

$$d=2$$

$$a_n = 5 + 2(n-1)$$

$$(39) \frac{1}{7}, 1, 7, 49, \dots$$

$\times 7 \times 7 \times 7$

geometric

$$a=\frac{1}{7}$$

$$r=7$$

$$a_n = \frac{1}{7}(7)^{n-1}$$

$$(40) 15, 17, 20, 23, 25$$

$\frac{+2}{+3}$

neither

$$41 \quad \frac{1}{3} - \frac{2}{3} + \frac{4}{3} - \frac{8}{3} + \dots$$

$r=2$
diverges

$$42 \quad 2S + 5 + 1 + \dots$$

$$r = \frac{1}{2}$$

$$S = \frac{2S}{1-\frac{1}{2}}$$

31.25

$$43 \quad (x-2y)^5$$

$$\begin{aligned} & \binom{5}{0}(x)^5(-2y)^0 + \binom{5}{1}(x)^4(-2y)^1 + \binom{5}{2}(x^3)(-2y)^2 + \binom{5}{3}(x)^2(-2y)^3 \\ & + \binom{5}{4}(x)^1(-2y)^4 + \binom{5}{5}(x)^0(-2y)^5 \end{aligned}$$

$\begin{smallmatrix} 1 & 1 & 1 \\ 1 & 3 & 3 \\ 1 & 4 & 6 & 4 \\ 1 & 5 & 10 & 10 & 5 \end{smallmatrix}$

$$x^5 - 10x^4y + 40x^3y^2 - 80x^2y^3 + 80xy^4 - 32y^5$$

$$44 \quad \text{3rd term } (2a+3b)^{12}$$

$$\binom{12}{2}(2a)^{10}(3b)^2$$

$$\frac{(12)(10!)}{(10!)(1024)}a^{10}(9)b^2$$

608256a¹⁰b²

Unit 5
conics



Pre-AP PreCalculus Fall Semester Exam Review

SOLUTIONS

51.

$$\sin \theta = -\frac{7\sqrt{74}}{74} \quad \csc \theta = -\frac{\sqrt{74}}{7}$$

$$\cos \theta = -\frac{5\sqrt{74}}{74} \quad \sec \theta = -\frac{\sqrt{74}}{5}$$

$$\tan \theta = \frac{7}{5} \quad \cot \theta = \frac{5}{7}$$

52. $\cos \frac{\pi}{4} \sin \frac{7\pi}{6} - \sin \frac{\pi}{6} \cos \frac{3\pi}{4}$

$$\left(\frac{\sqrt{2}}{2}\right)\left(-\frac{1}{2}\right) - \left(\frac{1}{2}\right)\left[-\frac{\sqrt{2}}{2}\right]$$

$$-\frac{\sqrt{2}}{4} + \frac{\sqrt{2}}{4} = 0$$

53. $\cot^2 \frac{11\pi}{6} - \csc^2 \frac{11\pi}{6}$

$$(-\sqrt{3})^2 - (-2)^2$$

$$3 - 4 = -1$$

54. $\sin \frac{\pi}{2} + 6 \cos \frac{\pi}{3} = (1) + 6\left(\frac{1}{2}\right) = 1 + 3 = 4$

55. $\frac{\cos \frac{5\pi}{3}}{\sin \frac{5\pi}{3}} = -\frac{\sqrt{3}}{3}$

56. $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{6} + \tan^2 \frac{\pi}{6} - \sec^2 \frac{\pi}{6}$

$$\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2 - \left(\frac{2}{\sqrt{3}}\right)^2$$

$$\frac{1}{4} + \frac{3}{4} + \frac{1}{3} - \frac{4}{3} = \frac{4}{4} - \frac{3}{3} = 0$$

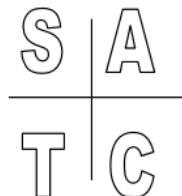
57. $40^\circ \cdot \frac{\pi}{180^\circ} = \frac{2\pi}{9}$

8. $\frac{\pi}{9} \cdot \frac{180^\circ}{\pi} = 20^\circ$

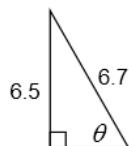
59. Positive: $84^\circ + 360^\circ = 444^\circ$

Negative: $84^\circ - 360^\circ = -276^\circ$

60. Q IV



61.

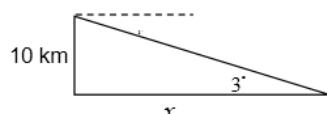


$$\sin \theta = \frac{6.5}{6.7}$$

$$\theta = \sin^{-1}\left(\frac{6.5}{6.7}\right)$$

$$\theta \approx 76^\circ$$

62.



a) $\tan 3 = \frac{10}{x}$

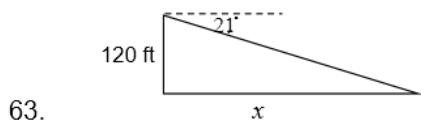
$$x = \frac{10}{\tan 3}$$

$$x \approx 190.81 \text{ km}$$

b) $\tan \theta = \frac{10}{300}$

$$\theta = \tan^{-1}\left(\frac{10}{300}\right)$$

$$\theta \approx 2^\circ$$



$$\sin 21^\circ = \frac{120}{x}$$

$$x = \frac{120}{\sin 21^\circ}$$

$$x \approx 334.85 \text{ ft}$$

Remember:

$$y = C + A \sin B(x - D) \quad \text{where}$$

A = amplitude

C = vertical displacement (shift)

D = horizontal displacement (shift)

$$\text{Period} = \frac{360}{B} = \frac{2\pi}{B} \text{ for sine or cosine}$$

$$\text{Period} = \frac{180}{B} = \frac{\pi}{B} \text{ for tangent}$$

Critical Points occur every $\frac{\text{Period}}{4}$

65. $y = -10 + 20 \sin 2\left(x - \frac{\pi}{8}\right)$

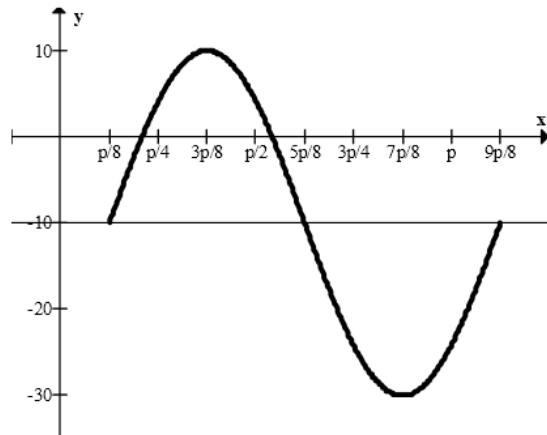
$$C = -10$$

$$A = 20$$

$$D = \frac{\pi}{8} \quad (\text{middle pt } @ \frac{\pi}{8})$$

$$\text{Period} = \frac{2\pi}{2} = \pi$$

$$\text{Crit. Pnts} = \frac{\pi}{4} = \frac{2\pi}{8}$$



66. $y = -5 \cos \frac{1}{2}(x + \pi) + 3$

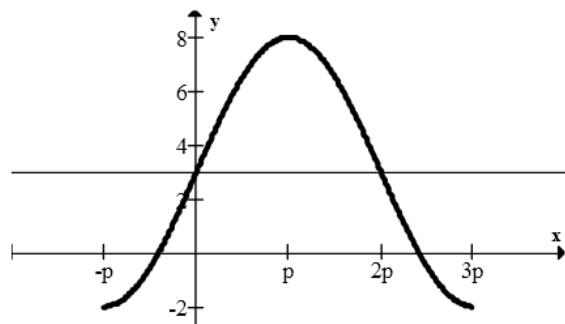
$$C = 3$$

$$A = 5$$

$$D = -\pi \quad (\text{Low point})$$

$$\text{Period} = \frac{2\pi}{\frac{1}{2}} = 4\pi$$

$$\text{Crit. Pnts} = \frac{4\pi}{4} = \pi$$



67. $y = 3 + 2 \cos \frac{1}{5}(x - \pi)$

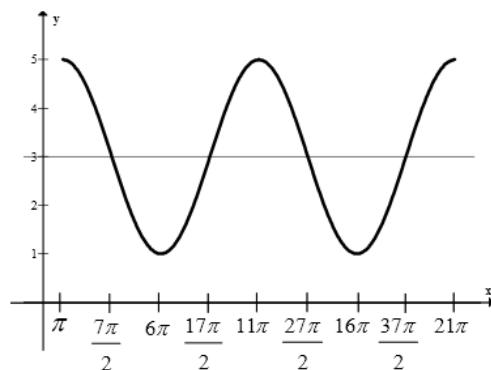
A = 2

C = 3

D = π (high point)

Period = $\frac{2\pi}{\frac{1}{5}} = 10\pi$

Crit. Pnts = $\frac{10\pi}{4} = \frac{5\pi}{2}$



68. $y = 2 - 6 \sin \frac{\pi}{4}(x - 1)$

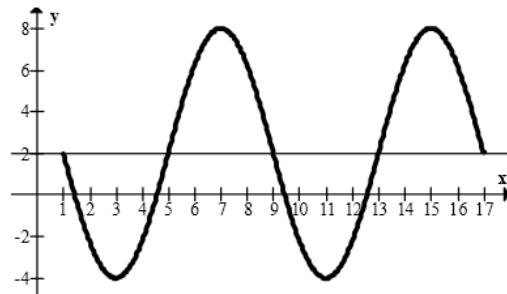
A = 6

C = 2

D = 1 (middle going down)

Period = $\frac{2\pi}{\frac{\pi}{4}} = 8$

Crit. Pnts = $\frac{8}{4} = 2$



69. $y = 1 + \sin 4\left(x + \frac{\pi}{4}\right)$

To find B $B = \frac{2\pi}{\text{Period}} = \frac{2\pi}{\frac{\pi}{2}} = 4$

$y = 1 - \sin 4(x)$

$y = 1 + \cos 4\left(x + \frac{\pi}{8}\right)$

$y = 1 - \cos 4\left(x - \frac{\pi}{8}\right)$

70. $y = -2 + 5 \sin \frac{\pi}{15}(x + 12.5)$ To find B $B = \frac{2\pi}{Period} = \frac{2\pi}{30} = \frac{\pi}{15}$

$$y = -2 - 5 \sin \frac{\pi}{15}(x - 2.5)$$

$$y = -2 + 5 \cos \frac{\pi}{15}(x + 5)$$

$$y = -2 - 5 \cos \frac{\pi}{15}(x - 10)$$

71. $y = 2 - 2 \sin \frac{\pi}{4}(x - 3)$ To find B $\frac{1}{2} Period = 4$
 $Period = 8$
 $B = \frac{2\pi}{Period} = \frac{2\pi}{8} = \frac{\pi}{4}$

72. $f(x) = 5 + 2 \cos \frac{\pi}{4}(x - 10)$

a) $f(17.3) = 5 + 2 \cos \frac{\pi}{4}(17.3 - 10)$

$$f(17.3) \approx 6.705$$

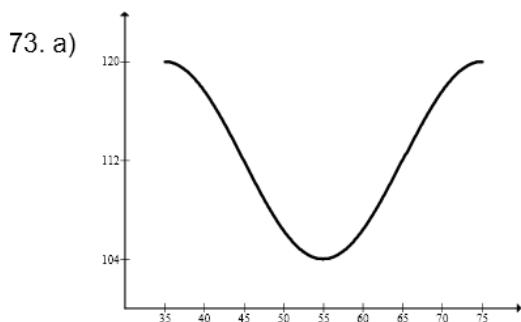
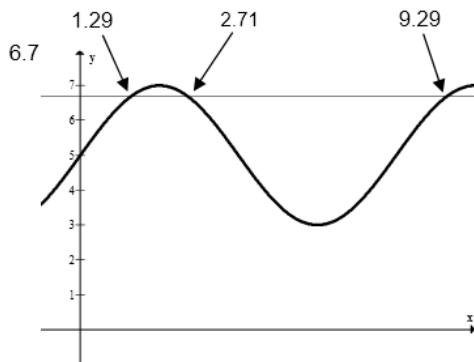
$$f(x) = 6.7$$

b) $6.7 = 5 + 2 \cos \frac{\pi}{4}(x - 10)$

$$x = 1.29, 2.71, 9.29$$

c) Maximum y-value is 7

$$x = 2$$



b) $y = 112 + 8 \cos \frac{\pi}{20}(x - 35)$

c) $y(0) \approx 118^\circ$

d) $114 = 112 + 8 \cos \frac{\pi}{20}(x - 35)$

$$x = 3.39, 26.61, 43.39$$

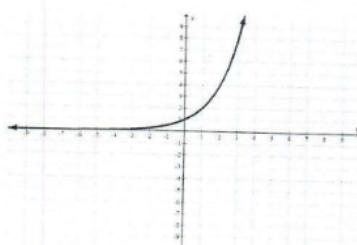
District Portion Semester Exam Review

Name: key

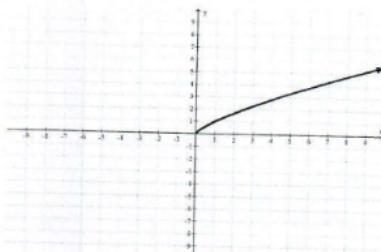
All of the district portion will be multiple choice, with calculator allowed. Check your answers on mskmath.com!

1. The graph of $f(x)$ and $g(x)$ is shown below.

$f(x)$



$g(x)$



Fill out the following table:

	$f(x)$	$g(x)$
Is the function continuous?	yes	yes
Asymptotes	$y=0$	none
Domain	$(-\infty, \infty)$	$[0, \infty)$
Increasing or Decreasing?	increasing	increasing from $(0, \infty)$

2. A finite series is shown below. What is the sum?

$$\sum_{n=1}^4 (n^3 - 1) = ((1)^3 - 1) + ((2)^3 - 1) + ((3)^3 - 1) + ((4)^3 - 1) = \boxed{96}$$

3. Given that $f(x)=3^{2x}$ and $g(x)=9^x$, graph the functions to determine the relationship between $f(x)$ and $g(x)$.

They're the same!

4. Westin purchased a piece of land in the shape of a right triangle on which to plant an apple orchard. On the first row of trees Westin planted 20 trees. Each subsequent row contained 2 less trees. How many apple trees would be planted on the sixth row?

20, 18, 16, ...

$$a_n = 20 + (-2)(n-1)$$

Arithmetic
 $a=20$ $d=-2$

$\boxed{10 \text{ trees}}$

5. The free-fall speed of an object, in terms of distance, measured in meters, can be modeled by the function

$s(d) = 4d^{\frac{1}{2}}$. If the free-fall speed is measured at 5.657 meters/second, approximately how far has the object fallen?

$$5.657 = 4d^{\frac{1}{2}}$$

(calculator)

$$\frac{5.657}{4} = d^{\frac{1}{2}}$$

$$(1.41425)^2 = (d^{\frac{1}{2}})^2$$

$$d = \boxed{2 \text{ m}}$$

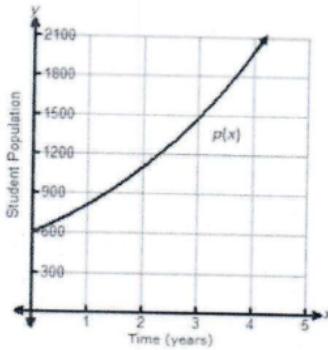
6. Find the inverse for the function $f(x) = (x-2)^3 + 1$

$$\begin{aligned} x &= (y-2)^3 + 1 \\ \sqrt[3]{x-1} &= \sqrt[3]{(y-2)^3} \end{aligned}$$

$$\sqrt[3]{x-1} + 2 = y$$

$$\boxed{f^{-1}(x) = \sqrt[3]{x-1} + 2}$$

7. A new high school starts with a population of 600 freshmen and sophomore students. Each year, the population increases by 35% per year. The school's population can be modeled by the function $p(x) = 600(1.35)^x$, where x represents time in years and $p(x)$ represents population of students.



Describe the end behavior of the function.

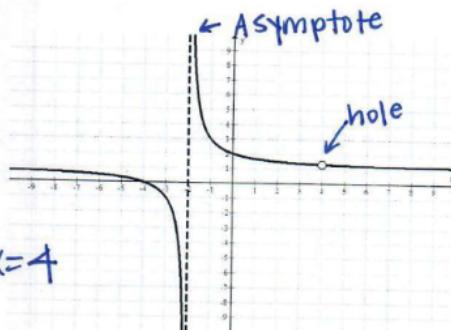
AS $x \rightarrow \infty$, $y \rightarrow \infty$

8. Describe the discontinuities for the graph of the function shown.

\curvearrowleft where you have to
pick up your pencil

Vertical asymptote at $x = -2$

Removeable discontinuity @ $x = 4$



9. An algebraic expression involving logarithms is shown below. Condense to a single log.

$$2\log(x-2) - \frac{1}{2}\log(x+2) + 6\log(x-1)$$

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

(same base, can condense!)

$$\boxed{\log\left(\frac{(x-2)^2(x-1)^6}{\sqrt{x+2}}\right)}$$

10. The equation of a rational function is shown below.

$$f(x) = \frac{x^2 - 16}{x^2 - 6x + 8} = \frac{(x-4)(x+4)}{(x-4)(x-2)} \quad \text{hole @ } x=4 \quad y = \frac{4+4}{4-2} = \frac{8}{2} = 4 \quad (4, 4)$$

(plug into remaining)

Describe the left-sided behavior and right-sided behavior of the rational function as $x \rightarrow 4$.

AS $x \rightarrow 4^+$, $y \rightarrow 4$

AS $x \rightarrow 4^-$, $y \rightarrow 4$

11. Which series of function compositions can be used to represent $f(x) = \frac{x^2 + 4}{x^2 + 1}$?

$$h(j(x)) = h(x^2)$$

$$= x^2 + 4$$

$$h(x) = x + 4$$

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

$$j(x) = x^2$$

- A. $f(x) = h(j(x))$ B. $f(x) = g(h(j(x)))$ C. $f(x) = j(h(g(x)))$ D. $f(x) = g(j(h(x)))$

12. Write a rational function that has both a vertical and an oblique asymptote.

$$\text{bottom} = 0 \quad \text{↑ one degree higher on top } y = \frac{x^2 + 2x + 1}{x + 2} \quad \text{etc}$$

13. The cost to inoculate $x\%$ of a population from a single strain of flu virus in billions of dollars, C , is given by the formula $C(x) = \frac{320}{100 - x}$. If the CDC has a budget of 7 billion dollars to spend on inoculations, then what is the maximum percentage of the population that it can afford to inoculate, rounded to the nearest hundredth?

calculator

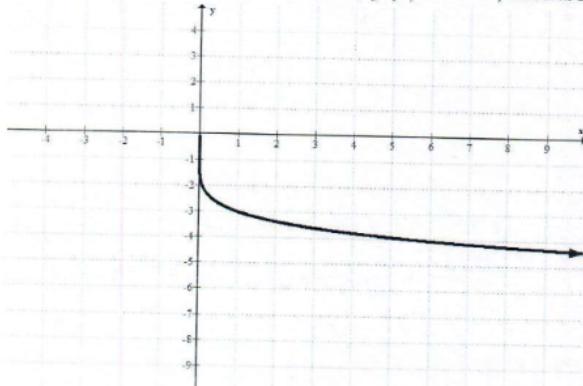
[Y=]

[54.29%]

$$\text{OR } 7 = \frac{320}{100 - x}$$

$$x = 54.29$$

14. Given the graph of the power function, $f(x) = -3x^{\frac{1}{6}}$, describe the end behavior of the graph.



AS $x \rightarrow \infty$, $y \rightarrow -\infty$

15. Given the polynomial function $f(x) = \frac{1}{3}(x+4)^2 - 5$, describe the transformations of the parent function.

Write "none" if the transformation does not apply.

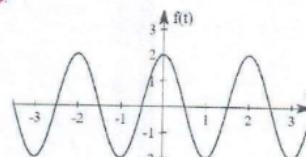
a. Vertical Shift: **down 5**

b. Horizontal Shift: **left 4**

c. Vertical **Compression/Stretch**: **by a factor of $\frac{1}{3}$**

d. Horizontal Compression/Stretch: **none**

vert. comp/stretch \rightarrow multiply
on outside
horiz. comp/stretch \rightarrow
multiply on inside



16. Find and justify the symmetry of the graph shown.

EVEN, symmetric over y -axis

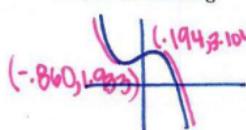
17. The price per unit, $p(q)$, of a popular copy machine, in terms of the quantity of copy machines demanded, q , is given by the formula $p(q) = 1500 - 150 \ln(q)$. Predict the number of copy machines demanded if the price per unit is \$500.

$$\begin{aligned} 500 &= 1500 - 150 \ln q \\ -1000 &= -150 \ln q \\ \frac{-1000}{-150} &= \frac{-150 \ln q}{-150} \end{aligned} \quad \begin{aligned} 6.67 &= \ln q \\ e^{6.67} &= q \end{aligned}$$

786 machines

18. Graph the function $f(x) = -2x^3 - 2x^2 + x + 3$. List the domain and range and where the function is increasing and/or decreasing.

CALCULATOR



domain: $(-\infty, \infty)$ increasing: $(-\infty, -0.86) \cup (0.194, \infty)$
range: $(-\infty, \infty)$ decreasing: $(-0.86, 0.194)$

19. Find a function for which an inverse function does not exist.

constant function, ex. $y=2$ (inverse would be $x=2$, which is not a function!)

20. The weight of a radioactive material in grams, w , over a period of weeks, t , is given by the table shown below.

t	0	1	2	3	4	5
w	50	47	43	40	37	35

Using the table of values, which equation best represents the data? *Plug each answer choice into*

A. $w = 50 - 3t$

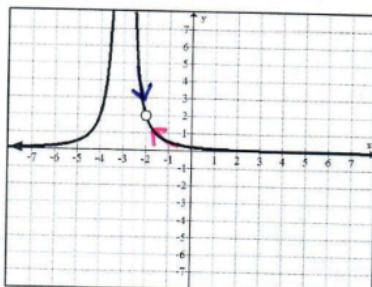
B. $w = 50t^{0.93}$

C. $w = 50(0.93)^t$

D. $w = 50 + (0.93)^t$

\boxed{C} , which table matches best?

21. Describe the following behavior.



Right side behavior as $x \rightarrow -2$, $f(x) \rightarrow \underline{\underline{2}}$

Left side behavior as $x \rightarrow -2$, $f(x) \rightarrow \underline{\underline{2}}$

If there WASN'T a hole at $x=-2$, what would the y -value be?

22. List all solutions to the equation $x^3 - 7x^2 + 12x = 0$.

$\boxed{\{0, 3, 4\}}$

$$\begin{aligned} x(x^2 - 7x + 12) &= 0 \\ x(x-3)(x-4) &= 0 \\ x=0 & \quad x-3=0 \quad x-4=0 \end{aligned}$$

23. If $f(x) = \log x$, list all of the transformations for the function $f(0.5(x-3))+1$.

a. Vertical Shift: up 1

b. Horizontal Shift: right 3

c. Vertical Compression/Stretch: none

d. Horizontal Compression/Stretch: by scale factor of 2

new function:

$\log(0.5(x-3))+1$

24. A new employee earns \$53,000 during his first year of work and receives a 2% raise each year. Write a sigma notation that could be used to determine the total amount earned by this employee over the first 10 years. Remember, it's a RAISE, he doesn't lose the money!

geometric

$a=53000 \quad r=1.02 \quad \boxed{[NOT 0.02]}$

$$\sum_{n=1}^{10} 53000 (1.02)^{n-1}$$

25. The equation for a rational function is given below.

$$f(x) = \frac{2}{x+3} - 4$$

Fill in the following information:

a. Domain: $(-\infty, -3) \cup (-3, \infty)$

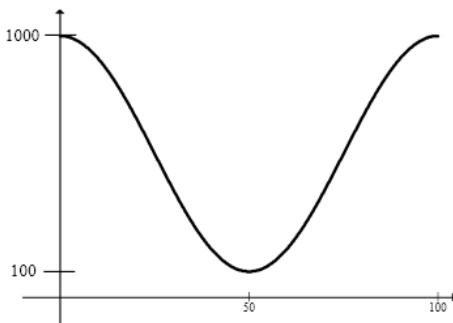
b. Range: $(-\infty, -4) \cup (-4, \infty)$

c. Horizontal asymptote: $y = -4$

d. Vertical asymptote: $x = -3$

e. Is the function increasing or decreasing? decreasing on domain
 $(-\infty, -3) \cup (-3, \infty)$

74.



a) $d = 550 + 450 \cos \frac{\pi}{50} t$

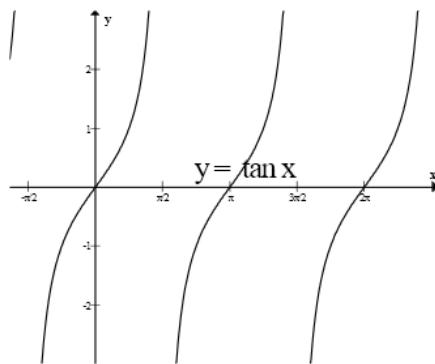
b) $t = \frac{\pi}{50} \cos^{-1} \left(\frac{d - 550}{450} \right)$

c) $700 = 550 + 450 \cos \frac{\pi}{50} t$

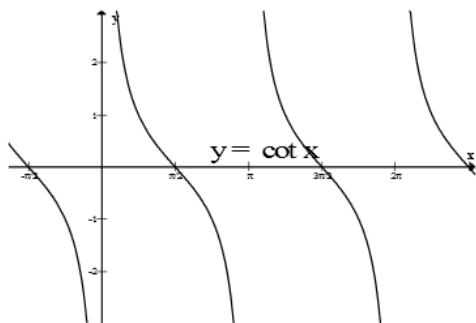
$t = 19.59, 80.41$

$80.41 - 19.59 = 60.82$ minutes

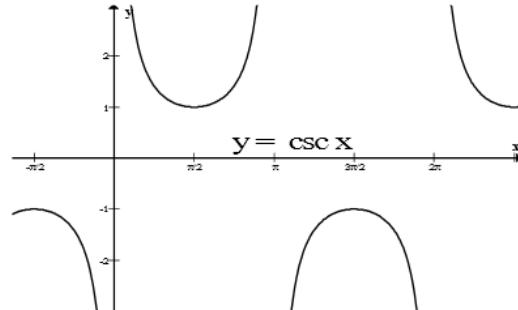
a)



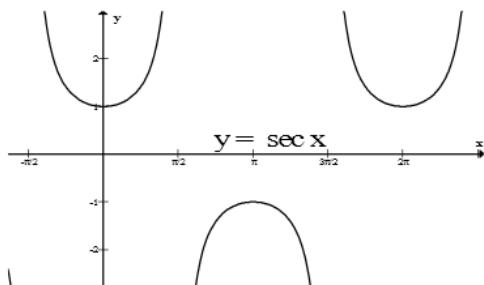
b)



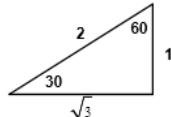
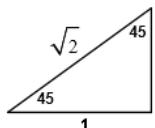
c)



d)



Good To Know



S	A
T	C

	S	C	T
0	0	1	0
90	1	0	U
180	0	-1	0
270	-1	0	U