

Precalculus Honors Semester 1 Review

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Precalculus Honors Semester 1 Review

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Precalculus Honors Semester 1 Learning Targets

- 1) Analyzing Functions
 - Increasing and decreasing intervals
 - Maximums and minimums
 - Finding domain and range
 - Asymptotes
 - Removable discontinuities
 - Finding complex zeroes
 - Limits
 - One to one
 - Even and odd and symmetry tests
 - Sketch a graph
- 2) Transformations
- 3) Composition of functions
- 4) Logarithms and logistics
- 5) Piecewise Functions
- 6) Sign patterns
- 7) Finding the inverse
- 8) Complex numbers
- 9) Compound interest
- 10) Sequences and series
- 11) Conics

Precalculus Honors

Arithmetic

$$a_n = a_{n-1} + d$$

$$a_n = a_1 + d(n-1)$$

$$S_n = \frac{n}{2}(2a_1 + d(n-1))$$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

Geometric

$$a_n = a_{n-1}r$$

$$a_n = a_1r^{n-1}$$

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

$$S_\infty = \frac{a_1}{1-r}$$

$$A = p \left(1 + \frac{r}{k} \right)^{kt}$$

Review

1) Write an equation of a quadratic with zeroes $x = \pm 2i$

2) Given: $y_2 = |3x - 2|$ if the first transformation from the parent function

$y_1 = |x|$ is a horizontal shrink B.A.F.O 3 what is the second transformation?

If the first transformation from the parent function $y_1 = |x|$ is right 2 what is the second transformation?

3) Solve for x .

$$2^{3x+5} = \frac{1}{16}$$

4) Find the inverse.

$$y = \frac{x-2}{x+3}$$

5) Find the domain.

$$y = \frac{1}{\sqrt{16-x^2}}$$

6) Solve for x .

$$\frac{2(x-5)\sqrt{2-x^2}}{|x-3|} \leq 0$$

7) Is the function symmetric to the y -axis? Is the function symmetric to the x -axis?
Is the function symmetric to the origin?

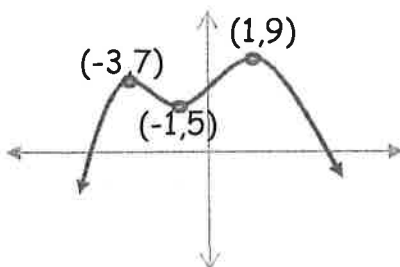
$$y = \frac{|x|}{x}$$

8) Find the horizontal and vertical asymptotes and the removable discontinuities.

$$y = \frac{x-1}{(x-1)(x+3)}$$

9) Solve for x . $\log_2(x-1) + \log_2(x+1) = 3$

10) Find the increasing and decreasing intervals and the local max and mins.



11) Sketch a graph.

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

12) Sketch a graph.

$$y = \begin{cases} \sqrt{2x} - 5 & \text{for } x > 0 \\ e^{2x} + 1 & \text{for } x \leq 0 \end{cases}$$

13) $f(x) = \frac{-1}{x-2}$

Find: $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$

14) find all complex zeroes

$$x^4 + x^3 - 6x^2 - 14x - 12$$

15) Write a rule for the nth term of an arithmetic sequence if $a_3 = 5$ and $a_5 = 11$

16) Use sigma notation to describe each

a) $3 + 5 + 7 + \dots + 31$

b) $2 + 4 + 8 + \dots + 1024$

c) $4 + 2 + 1 + \frac{1}{2} + \frac{1}{4} + \dots$

17) How long will it take an investment to triple if it is compounded continuously at 7% A.P.R.?

18) What is the A.P.Y. for an investment compounded quarterly at 5.2% A.P.R.?

19) If the half-life of a particular substance is 10 days how long will it take a 100 gram sample to be less than 1 gram?

20) Write an equation of a parabola with directrix $x = 1$ and vertex $(-3, 4)$

21) Write an equation of an ellipse with foci $(\pm 2, 0)$ and major axis length 8.

22) Sketch a graph $\frac{x^2}{9} - \frac{(y+1)^2}{16} = 1$

Key Semester 1 Review. Precal H

① $y = (x-2i)(x+2i)$

$y = x^2 + 4$

② $y_2 = 13(x - \frac{2}{3})$

horiz shrink baf 3
right $\frac{2}{3}$

③ $2^{3x+5} = 2^{-4}$

$x+5 = -4$

$3x = -9$

$x = -3$

or

$y_2 = 13x - 21$

right 2
horiz. shrink baf 3

④ $x = \frac{y-2}{y+3}$

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

$xy + 3x = y - 2$

$xy - y = -3x - 2$

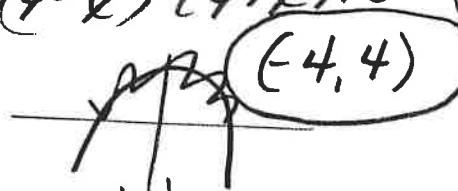
$y(x-1) = -3x-2$

$y = \frac{-3x-2}{x-1}$

⑤ $y = \frac{1}{\sqrt{16-x^2}}$

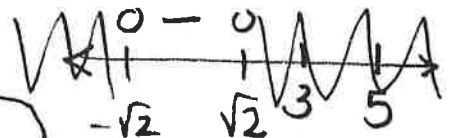
$16-x^2 > 0$

$(4-x)(4+x) > 0$

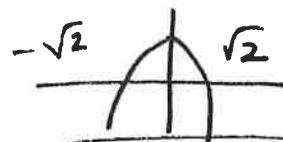


⑥ $\frac{2(x-5)\sqrt{2-x^2}}{|x-3|} \leq 0$

$|x-3|$

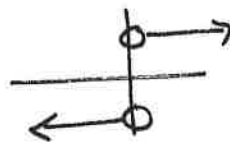


$2-x^2 \geq 0$



$[-\sqrt{2}, \sqrt{2}]$

⑦ $y = \frac{|x|}{x}$



Symmetric to the origin

$(x, y) \rightarrow (-x, -y)$

$-y = \frac{|-x|}{-x}$

$y = \frac{|x|}{x}$

⑧ $y = \frac{x-1}{(x-1)(x+3)}$

$y = \frac{1}{x+3}$

V.A $x = -3$ HA $y = 0$
RD $(1, \frac{1}{4})$

⑨ $\log_2(x^2-1) = 3$

$2^3 = x^2 - 1$

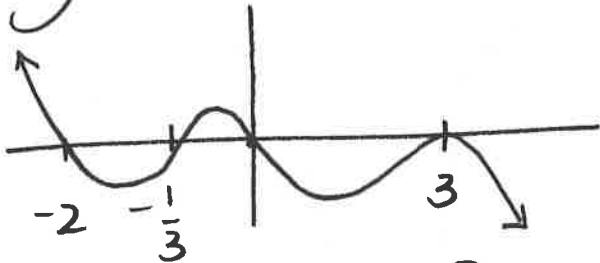
$0 = x^2 - 9$

$0 = (x-3)(x+3)$
 $x = 3$ ~~$x = -3$~~

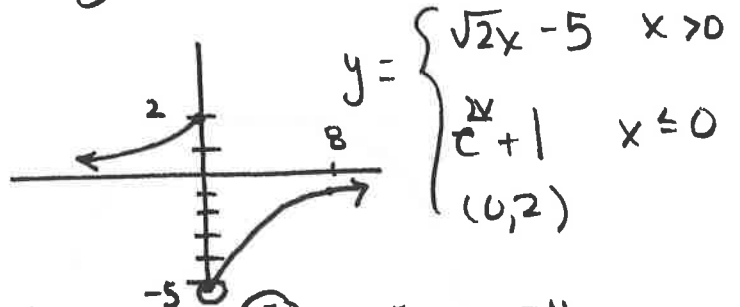
⑩ I $(-\infty, -3]$ $[-1, 1]$
 D $[-3, -1]$ $[1, \infty)$

local max
 $y=7$ at $x=-3$
 $y=9$ at $x=1$
 local min

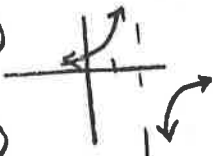
⑪ $y = -2x^3(3x+1)(x-3)(x+2)$



⑫



⑬ $\lim_{x \rightarrow \infty} f(x)$ ①
 $\lim_{x \rightarrow -\infty} f(x)$ ②



⑭ $x^4 + x^3 - 6x^2 - 14x - 12$
 Possibles $\pm 1, 2, 3, 4, 6, 12$
 $x = -2$ $x = -1 \pm i$
 $x = 3$

⑮ $a_3 = 5$ $a_5 = 11$
 $a_n = a_1 + d(n-1)$
 $d = \frac{11-5}{2} = 3$
 $a_n = -1 + 3(n-1)$
 $a_n = 3n - 4$

⑯ a $\sum_{k=1}^{15} (2k+1)$
 $a_n = a_1 + d(n-1)$
 $31 = 3 + 2(n-1)$
 $n = 15$

b $\sum_{k=1}^8 2(2)^{k-1}$
 $a_n = a_1 r^{n-1}$
 $1024 = 2(2)^{n-1}$
 $512 = 2^{n-1}$
 $n = 8$

c $\sum_{k=1}^{\infty} 4(\frac{1}{2})^{k-1}$

⑰

$1 = 100(\frac{1}{2})^{t/10}$
 $\frac{1}{100} = (\frac{1}{2})^{t/10}$
 $\log_{\frac{1}{2}} \frac{1}{100} = \frac{t}{10}$

⑱ $3 = 1e^{.07t}$
 $\log_e 3 = .07t$
 15.69 years

⑲ $1(1 + \frac{.052}{4})^4 = 1+r$
 5.3% A.P.Y.

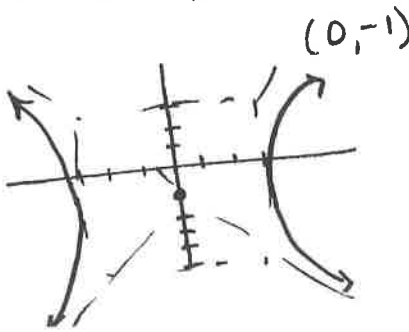
$t = 66.44$ days

⑳ $(-3, 4)$ $\wedge x=1$
 $p=4$
 $(y-k)^2 = 4p(x-h)$
 $(y-4)^2 = 16(x+3)$

㉑

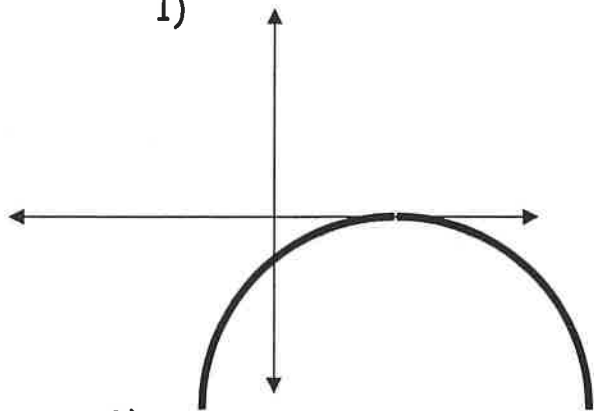
center $(0, 0)$
 $c=2$
 $a=4$
 $a^2 = b^2 + c^2$
 $16 = b^2 + 4$
 $b^2 = 12$
 $\frac{(x-0)^2}{16} + \frac{(y-0)^2}{12} = 1$

㉒ $\frac{x^2}{9} - \frac{(y+1)^2}{16} = 1$
 $a=3$ $b=4$

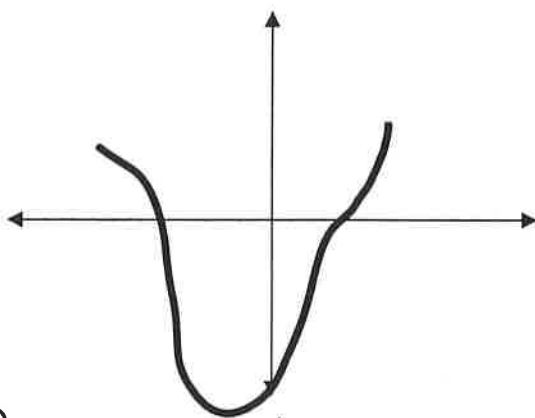


Precalculus 2.5 and 2.6 Matching

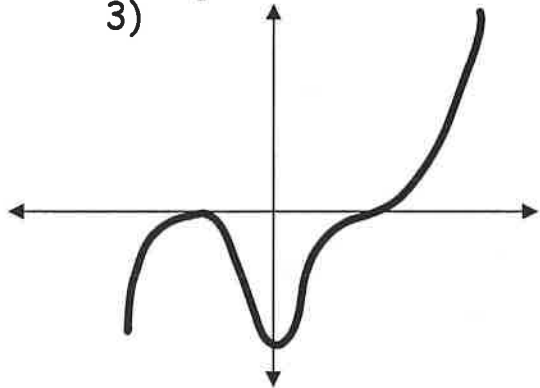
1)



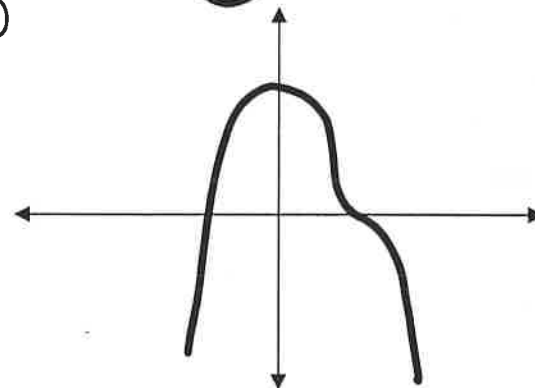
2)



3)



4)



A) $y = -(x-2)^2(x^2+4)$

B) $y = -(x-2)^2(x^2-4)$

C) $y = (x-2)^3(x^2-4)^2$

D) $y = (x-2)^2(x^2-4)^3$

Key (i)

Precalculus Honors 9.4

- 1) Find the sum of the first 40 positive multiples of 3.

$$3 + 6 + 9 + \dots \quad S_n = \frac{n(a_1 + a_n)}{2}$$

$$d = 3$$

$$S_{40} = \textcircled{2400}$$

- 2) Find the common difference in an arithmetic sequence

given:

$$S_n = 3400$$

$$n = 100$$

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$3400 = 50(1 + 1 + 99d)$$

$$a_1 = 1$$

$$a_{100} = 1 + 99d$$

$$d = \frac{2}{3}$$

- 3) Find the sum of the series.

$$\sum_{k=1}^{25} (7 - 2k) = 5 + 3 + 1 + \dots - 43$$

$$S_{25} = \frac{(5 + -43) \cdot 25}{2}$$

$$S_{25} = -475$$

- 4) Given a geometric series with
- $a_1 = \frac{1}{2}$
- and
- $a_9 = \frac{1}{64}$
-
- Find the infinite sum

$$4, 2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$$

$$r = \left(\frac{1}{32}\right)^{\frac{1}{5}}$$

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

$$S_{\infty} = \frac{a_1}{1-r}$$

$$= \frac{4}{1-\frac{1}{2}}$$

$$= \textcircled{8}$$

Precalculus Honors 9.4

- 1) Find the sum of the first 40 positive multiples of 3.

$$S_n = \frac{n(a_1 + a_n)}{2}$$

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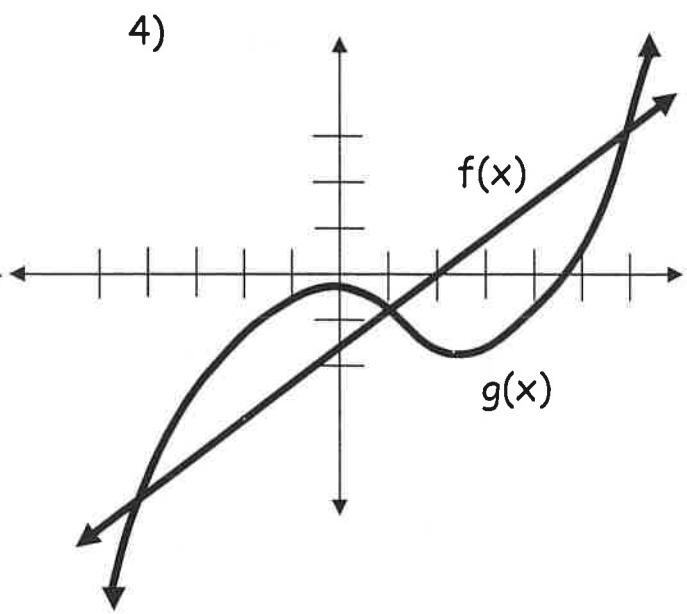
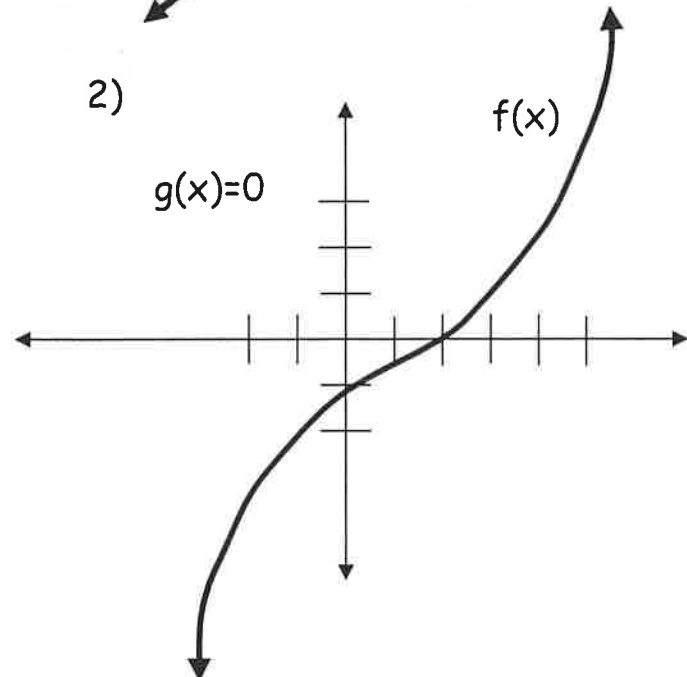
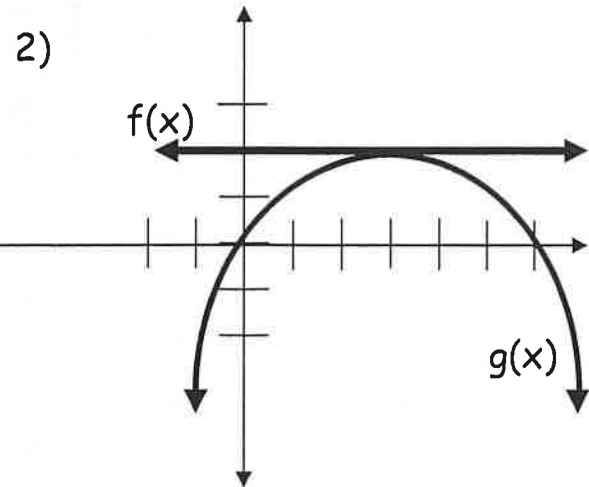
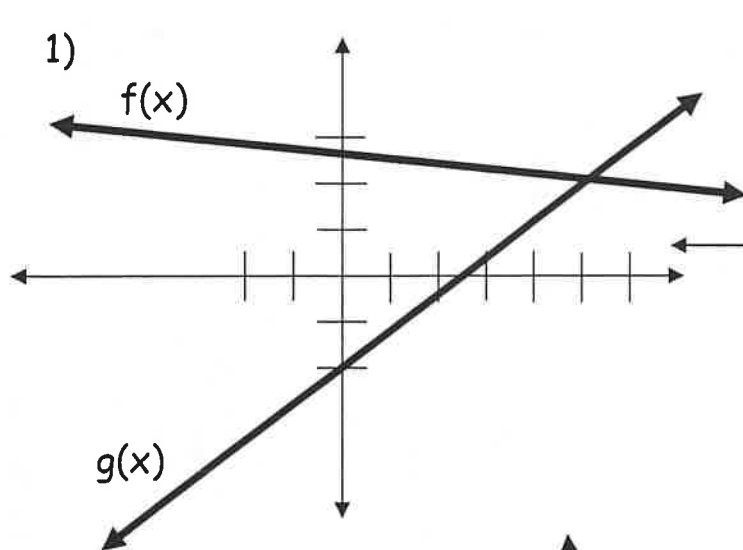
$$\sum_{k=1}^{25} (7 - 2k)$$

- 4) Given a geometric series with
- $a_1 = \frac{1}{2}$
- and
- $a_9 = \frac{1}{64}$
-
- Find the infinite sum

Precalculus Honors Practice P1 - P6

Name _____

Part I Solve for x if $f(x) \leq g(x)$.



Part II Solve for x .

5) $\frac{x^2 - 1}{3 - x} \geq 0$