PRE-CALCULUS 12

Review Questions

Learning Guides 1 – 16

DEJA REVU PACKAGE

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Learning Guides 1 & 2

1. **Given** $y = f(x)$ **find** $y = f^{-1}(x)$ **(or find** $x = f(y)$**, (find the reflection in the line y = x, find the inverse) for each of the following. In each case, determine if the inverse is a function.**

a) $f(x) = \dfrac{2x}{4-x}$ **b)** $f(x) = 3(x-1)^2 - 5$ **c)** $f(x) = \sqrt[3]{5x-1} + 2$

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2. **Describe how the graph of** $y = -3f(8-2x) - 7$ **is related to the graph of** $y = f(x)$**.**

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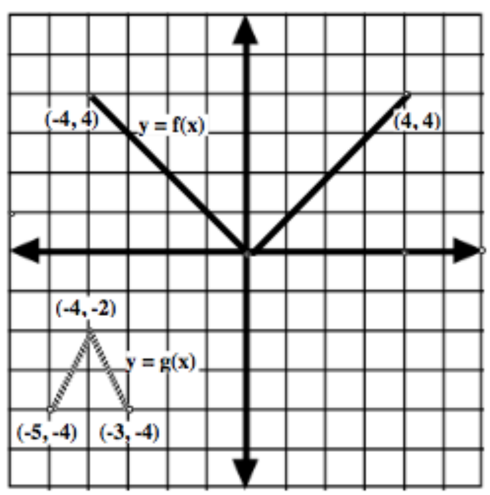
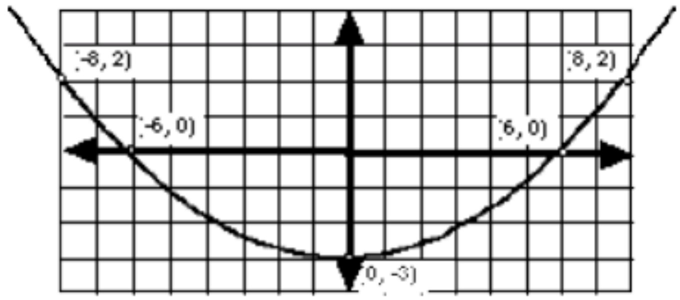
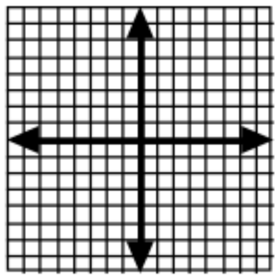
3. **Write the equation for the graph of** $y = g(x)$ **as a transformation of the graph of** $y = f(x)$**.**



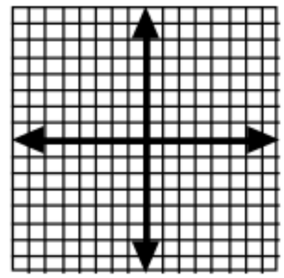
4. **Given the graph of $y = f(x)$ below, sketch each of the following graphs:**



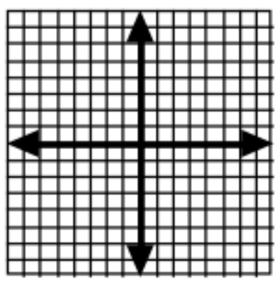
a) $y = 3f(2x - 2) + 5$



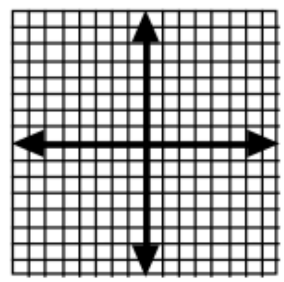
b) $y + 1 = -2f(2x - 6)$



c) $y = 3f(-(x - 1)) - 5$



c) $y - 3 = -2f(8 - 4x)$



Learning Guide 3

1. **Use the Remainder Theorem, to find the remainder for:**

   $x^3 - 8x^2 + 2x + 6$ *is divided by* $x - 1$

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2. **Find the value of *k* so that each remainder is 8.**

   $(3x^2 + 2kx - 20) \div (x + 2)$

3. **Factor completely.** $2x^3 - 3x^2 - 8x + 12$

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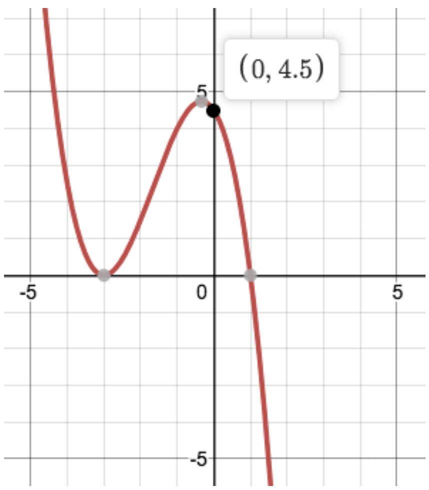
4. **Write an equation for graph below:**



Learning Guides 4 & 5

1. Solve exactly for x algebraically:

a) $8^{2x+3} = 4^{5x-2}$

b) $9^{3-2x} = \left(\frac{1}{27}\right)^{x+4}$

c) $\left(\frac{1}{16}\right)^{2x-1} = 8^{3x+2}$

d) $5^{x+1} = 8^{2x-3}$

2. **A bacteria with an initial population of 500 grows to 10000 in 12 hours. What is the doubling period of these bacteria? Solve algebraically using logarithms. Answer accurate to at least 2 decimal places.**

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3. **A 200g sample of U-239 decays to 4g in 18 minutes. What is the half-life of this material? Solve algebraically using logarithms. Answer accurate to at least 2 decimal places.**

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4. **Write each of the following expressions as a single logarithm:**

a) $3\log A - \frac{1}{2}\log B - 4\log C + \frac{1}{5}\log D$ **b)** $2\log A - 5\log B$ **c)** $3 + \frac{1}{2}\log_2 x - 3\log_2 y$

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5. Solve for *x*:

$a)$ $\log_2(x) + \log_2(x-2) = 3$

$b)$ $\log_5(x) + \log_5(1-x) = \log_5(2-2x)$

$c)$ $\log(x+5) - \log(x+1) = \log(3x)$

$d)$ $2\log_4(x) - \log_4(x+3) = 1$

Learning Guide 6

1. Find the missing term or terms in each geometric sequence.

a) $\ldots, \frac{1}{2}, \_\_\_\_, \_\_\_\_, \_\_\_\_, \frac{1}{162}, \ldots$ *b)* $\ldots, -3, \_\_\_\_, \_\_\_\_, \frac{8}{9}, \ldots$

2. Find the sum of each geometric series.

$find\ S_7\ \ for\ 1, -6, 36, \ldots$

3. Determine the sum of the infinite geometric series.

$t_1 = 3, \ r = -\frac{1}{5}$

4. Write the series using sigma notation.

a) $-1 + 4 + 9 + 14 + 19$ **b)** $6 + 1 + \frac{1}{6} + \ldots + \frac{1}{7776}$ **c)** $\frac{1}{2} + \frac{4}{3} + \frac{9}{4} + \frac{16}{5}$

5. Write out the following as a sum.

$$\sum_{n=2}^{5} 3^{n+2}$$

Learning Guides 7 & 8

1.

Given $g(x) = \dfrac{1}{(x+3)}$ **and** $h(x) = \dfrac{1}{(x^2 - 9)}$ **determine the equation of the combined function** $f(x) = \dfrac{g(x)}{h(x)}$ **and state its domain and range.**

2.

If $f(x) = \dfrac{-4}{x}$ **and** $g(x) = \sqrt{x}$ **determine** $(f \circ g)(x)$ **and state the domain and the range of y.**

3.

If $f(x) = |x - 4|$ **and** $g(x) = 4 + x$ **find each of the following functions and state the domain and range:**

a) $(g \circ f)(x)$ **b)** $(f \circ g)(x)$ **c)** $g(g(x))$

4.

Given the function $y = \dfrac{5x}{(x+2)} - 3$**, identify any asymptotes, any intercepts and find the domain and range.**

5.

Given the function $y = \dfrac{x^2 + 6x}{x^2 + 9x + 18}$ **find any intercepts, any asymptotes and any points of discontinuity. State the domain and range.**

6.

Write an equation of a rational function having each set of characteristics:

a) vertical asymptotes at x = 2 and x = -5, x-intercepts at (-6, 0) and (1, 0) and y-intercept of (0, 8).

b) vertical asymptotes at x = -2 and x = 5, point of discontinuity at (1, 6) and an x-intercept of (-3, 0).

7.

Solve each of the following equations algebraically:

a) $\dfrac{2x}{(x+3)} = 2 + \dfrac{4}{x}$

b) $\dfrac{6x+18}{(x-1)} = 2x + 6$

Learning Guides 10 & 11

1. **a)** **If** $\sin A = \frac{1}{4}$ **and** $0 \le A < 2\pi$, **find the exact value(s) of** $\cot A$.

b) **If** $\sin A = \frac{1}{4}$ **and angle A is in the second quadrant find the exact value(s) of** $\sec A$.

c) **If** $\cos A = \frac{-1}{3}$ **and** $\tan A > 0$ **find the exact value(s) of** $\csc A$.

d) **If** $\cos A = \frac{-1}{3}$ **and** $180^\circ \le A < 360^\circ$ **find the exact value(s) of** $\tan A$.

e) **If** $\sin A = \frac{-1}{3}$ **and** $\frac{-\pi}{2} \le A < 0$, **find the exact value(s) of** $\sec A$.

Learning Guides 12 & 13

1. **Find a function in the form y =** $y = A\sin B(x - C) + D$ **and** $y = A\cos B(x - C) + D$ **if it has a maximum point of (3, 4) and the closest minimum point to the right is (7, -6).**

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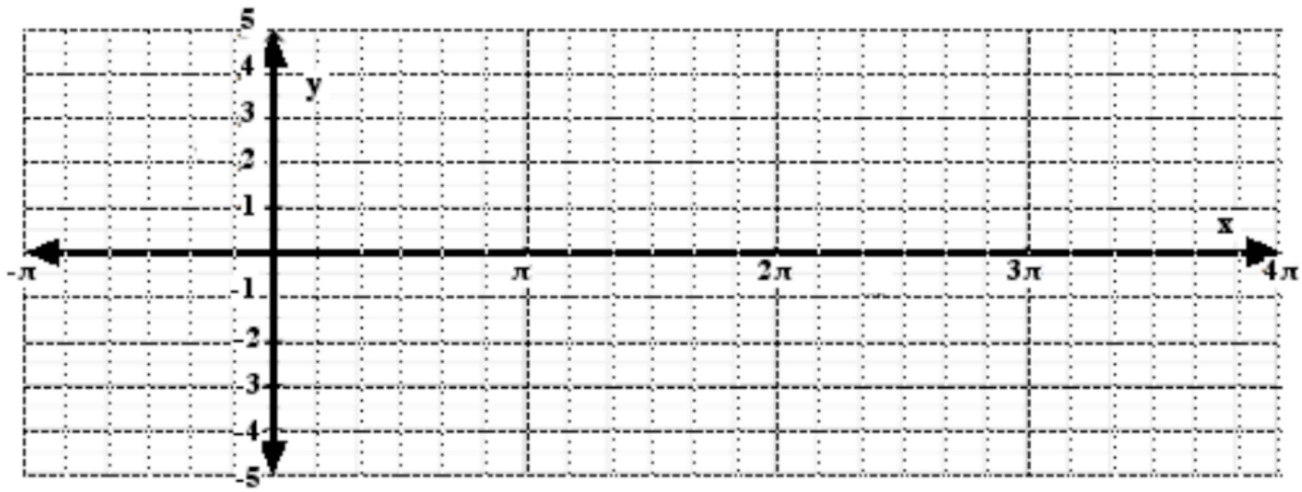
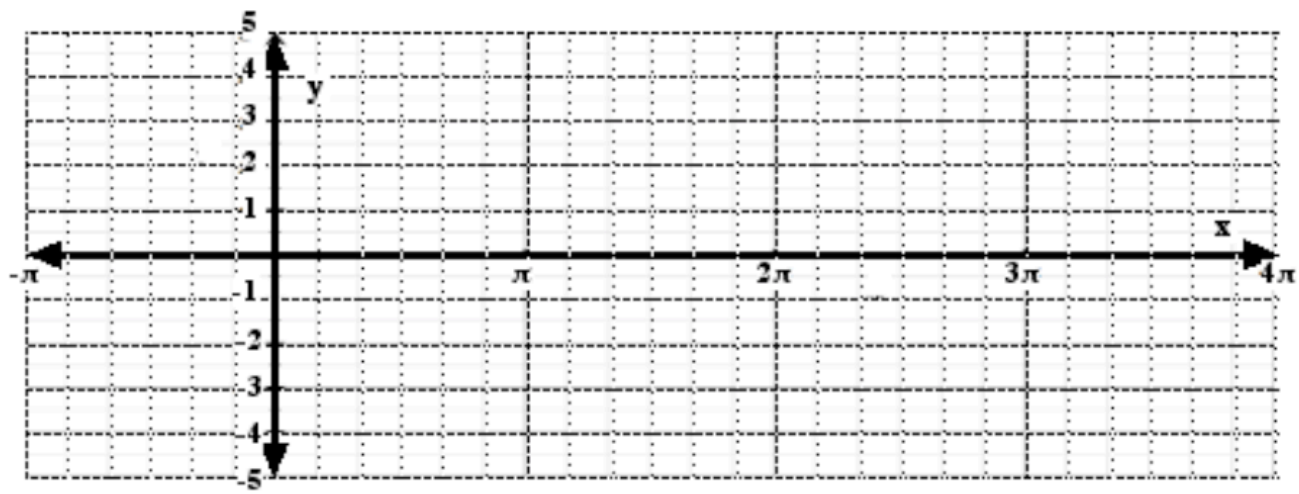
2. **Graph the following trig function over two cycles:** $y = 3\sin 2\left(x + \frac{\pi}{3}\right) - 1$.



3. **Graph the following trig function over** $0 \le A < 4\pi$: $y = -2\cos 2(x - \pi) + 3$.



4) **A Ferris wheel with a radius of 10m rotates once every 60 seconds. The center of the Ferris wheel is 12m above the ground and passengers get on the ride at the lowest point on the wheel.**

a) Write a sinusoidal equation to model the path of a passenger on this ride where height is a function of time.

b) How high will a passenger be 2.5 minutes after getting on the ride?

c) Find the first two times that a passenger reaches a height of 20m after getting on the ride.

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5) **Find the equation of a sinusoidal function having the following characteristics:**

a) The function has a minimum of (2π, -20) and the closest maximum point of (8π, -2).

b) The function has a maximum of $(\frac{-5}{3}, 18)$**, the next maximum point of** $(\frac{8}{5}, 18)$ **and the range of the function is** $-4 \le y \le 18$**.**

Learning Guides 14 & 15

1. Prove each of the following identities:

a) $\frac{Tanx}{Secx-1} = \frac{Secx+1}{Tanx}$

b) $\cot A = \frac{2+2Cos2x}{2Sin2x}$

c) $2\csc 2x = \cot x + \tan x$

d) $\frac{1+SecA}{TanA+SinA} = \frac{2Csc2A}{SecA}$

e) $\frac{2Cosx+2Cos^2x}{Sin2x} = \frac{Sinx}{1-Cosx}$

f) $\frac{Tanx+Sinx}{1+Cosx} = \frac{Sin2x}{Cos^2x} - \frac{1}{Cotx}$

Learning Guide 16

1.

Solve algebraically, giving exact values for x wherever possible, where $-\pi \le A < \pi$:

a) $4\cos x + 2 = 0$

b) $\sin^2 x + 3\sin x + 2 = 0$

2.

Solve algebraically, giving exact values for x wherever possible, $0 \le A < 2\pi$ and give the general solution:

a) $\sqrt{3}\csc x - 2 = 0$

b) $2\cos x - \sqrt{3} = 0$

c) $\sin 2x - \sin x = 0$

d) $\sin x - \cos 2x = 0$

e) $3\csc x - \sin x = 2$

f) $\sin^2 x = \cos x - \cos^2 x$

3.

Solve algebraically over the real numbers. Give exact values wherever possible:

a) $\sin^2 A + 4\sin A + 2 = 0$

b) $\tan^2 x - \tan x - 2 = 0$

Solve algebraically over the real numbers. Give exact values wherever possible:

c) $\cos^2 x + \cos x - 1 = 0$

d) $3\cos^2 B - 3\cos B = 0$

e) $2\cos x \tan x - \tan x = 0$

f) $\sin x - \sqrt{2}\sin x \cos x = 0$

g) $\cos^2 x = \cos x$

h) $\sin x = \cos 2x$

4.

Solve $6\sin^2 A - \sin A - 1 = 0$ **algebraically over the given domains:**

a) $0 \le A < 2\pi$

b) $\frac{\pi}{2} \le A < \frac{3\pi}{2}$

c) $-\pi \le A < 0$

d) $\frac{-3\pi}{2} \le A < -\pi$