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Frances Kelsey Secondary

Pre-Calculus 12

Final Exam D

Multiple Choice Score	Free Response Score	FINAL SCORE
<div style="border-bottom: 1px solid black; margin: 0 auto; width: 80%;"></div> <div style="margin-top: 5px;">15</div>	+	<div style="border-bottom: 1px solid black; margin: 0 auto; width: 80%;"></div> <div style="margin-top: 5px;">25</div>
		=
		<div style="border-bottom: 1px solid black; margin: 0 auto; width: 80%;"></div> <div style="margin-top: 5px;">40</div>

VALUE

THIS EXAMINATION CONSISTS OF **TWO** PARTS.

PART A:	15 MULTIPLE-CHOICE QUESTIONS	15
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PART B:	5 WRITTEN RESPONSE QUESTIONS	<u>25</u>
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TOTAL	40
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1.

Which equation represents the graph of $y = f(x)$ after it is vertically compressed by a factor of $\frac{1}{2}$ and then translated 2 units to the left?

A. $\frac{y}{2} = f(x+2)$

B. $\frac{y}{2} = f(x-2)$

C. $2y = f(x+2)$

D. $2y = f(x-2)$

2.

If the point $(10, 6)$ is on the graph of $y = f(x)$, what point must be on the graph of $y = f(-2x - 4)$?

A. $(-7, 6)$

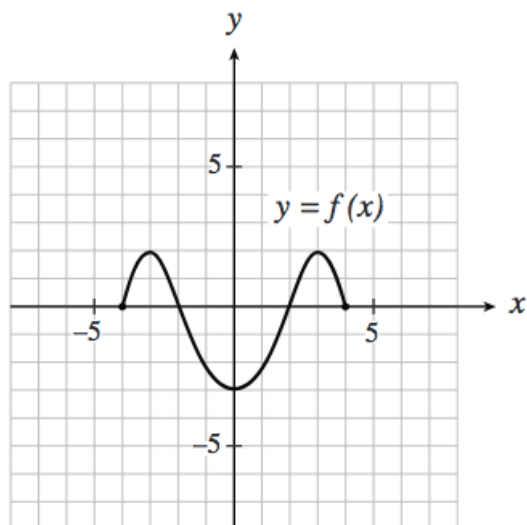
B. $(-9, 6)$

C. $(-22, 6)$

D. $(-24, 6)$

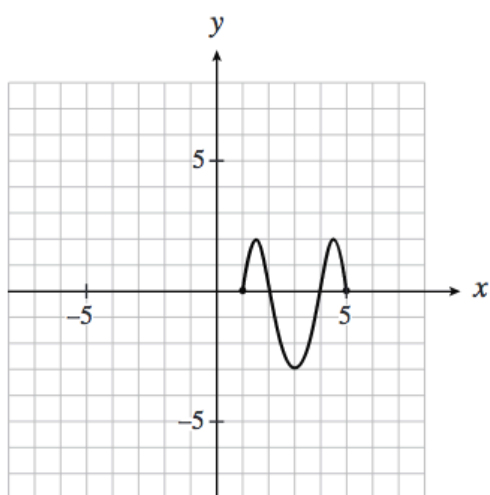
3.

The graph of the function $y = f(x)$ is shown below.

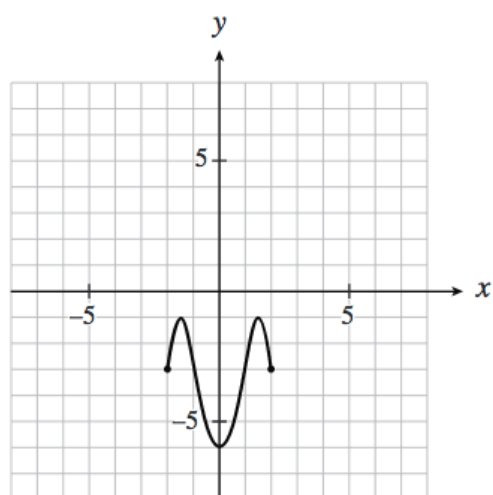


Which of the following is the graph of $y = f(2x) - 3$?

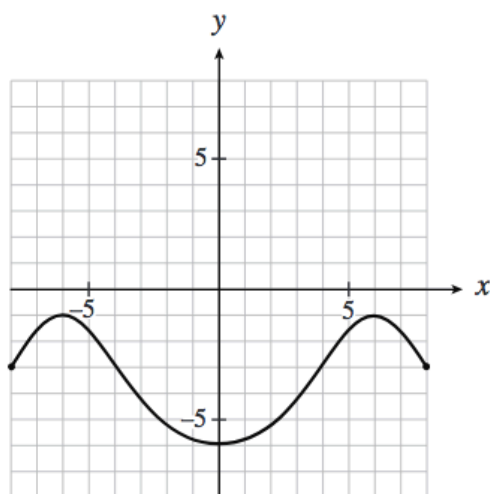
A.



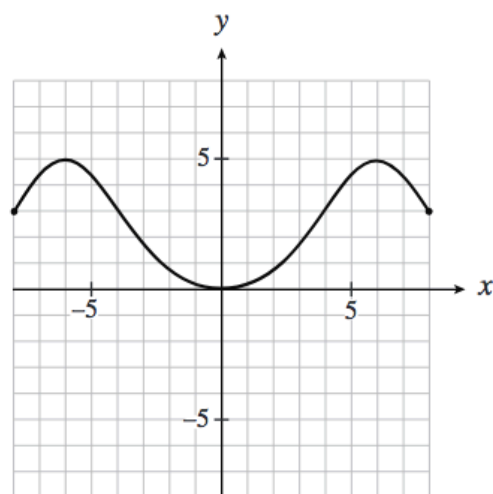
B.



C.



D.



4.

Determine the sum of the infinite geometric series $16 - 12 + 9 - \dots$

A. $\frac{48}{7}$

B. $\frac{64}{7}$

C. 64

D. no finite sum

5.

Solve: $9^x = 27^{x-3}$

A. -9

B. 3

C. $\frac{9}{2}$

D. 9

6.

Solve: $\log_2(\log_9 x) = -1$

A. $\frac{1}{81}$

B. $\frac{1}{3}$

C. 3

D. 81

7.

Determine the domain of $y = \log(x + 1)$.

A. $x < 1$

B. $x > 1$

C. $x < -1$

D. $x > -1$

8.

Given $f(x) = 2x + 2$ and $g(x) = 3x + 3$, what is an equation for $f(g(x))$?

A. $f(g(x)) = -6x - 9$

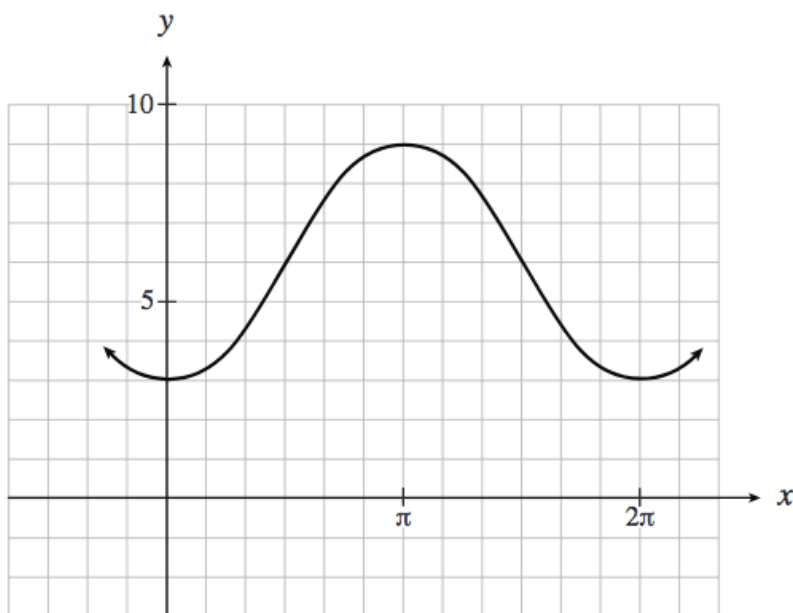
C. $f(g(x)) = 6x + 9$

B. $f(g(x)) = -6x - 8$

D. $f(g(x)) = 6x + 8$

9.

If the graph of the function shown below has the equation $y = a \cos b(x - c) + d$, determine the value of d .



- A. 3
- B. 5
- C. 6
- D. 9

10.

Which expression is equivalent to $\sin(\pi + 2x)$?

- A. $2\cos^2 x - 1$
 - B. $1 - 2\cos^2 x$
 - C. $2\sin x \cos x$
 - D. $-2\sin x \cos x$
-

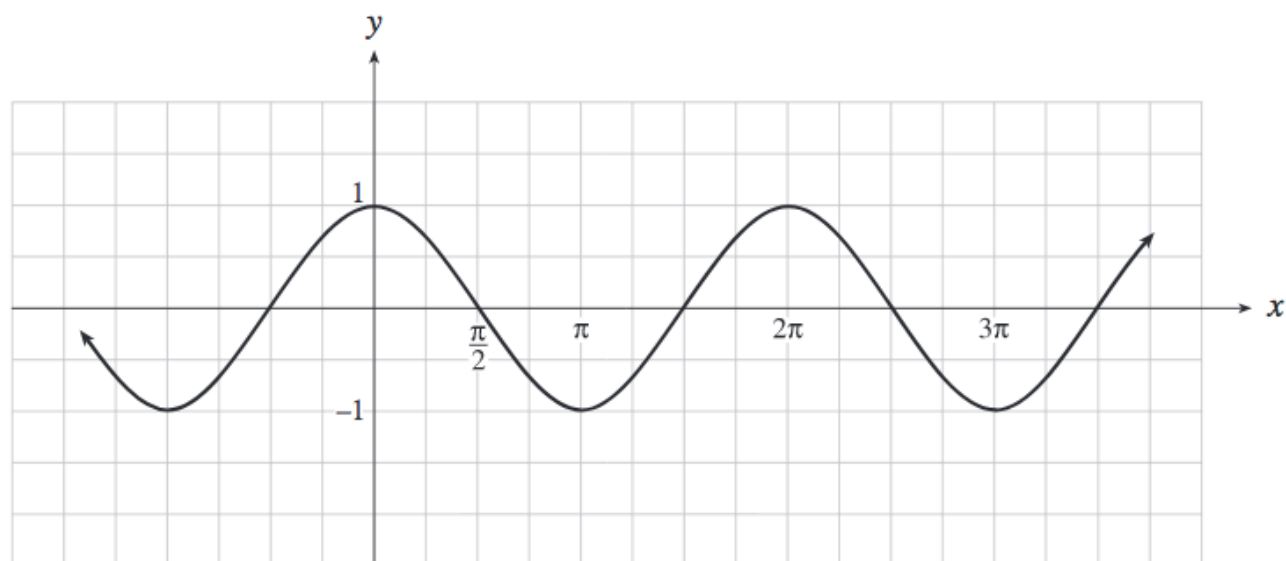
11.

Determine the period of the function $y = 3\cos\frac{\pi}{4}x$.

- A. $\frac{\pi}{4}$
- B. $\frac{\pi}{2}$
- C. 4
- D. 8

12.

Which equation represents the function graphed below?



- A. $y = \cos\left(x + \frac{\pi}{2}\right)$
- B. $y = \sin\left(x - \frac{\pi}{2}\right)$
- C. $y = -\cos\left(x - \frac{\pi}{2}\right)$
- D. $y = -\sin\left(x - \frac{\pi}{2}\right)$

13. Identify any vertical asymptotes, horizontal asymptotes and points of discontinuity of

$$f(x) = \frac{x^3 + 4x^2 + 4x}{x^2 + 5x + 6}.$$

- A. $VA: x = -3;$ $HA: y = 0;$ $POD: x = -2$
- B. $VA: x = 3;$ $HA: y = DNE;$ $POD: x = -2$
- C. $VA: x = -3;$ $HA: y = 0;$ $POD: x = 2$
- D. $VA: x = -3;$ $HA: y = DNE;$ $POD: x = -2$

14.

Which expression is equivalent to $\cot \theta + \tan \theta$?

- A. $\frac{1}{\sin \theta \cos \theta}$
- B. $\frac{\cos \theta + \sin \theta}{\sin \theta \cos \theta}$
- C. 1
- D. 2

15.

Solve $\sin^2 x = -4 \sin x - 3$ exactly, $0 \leq x < 2\pi$

- A. $\frac{\pi}{2}$
- B. 0
- C. $\frac{3\pi}{2}$
- D. No solution

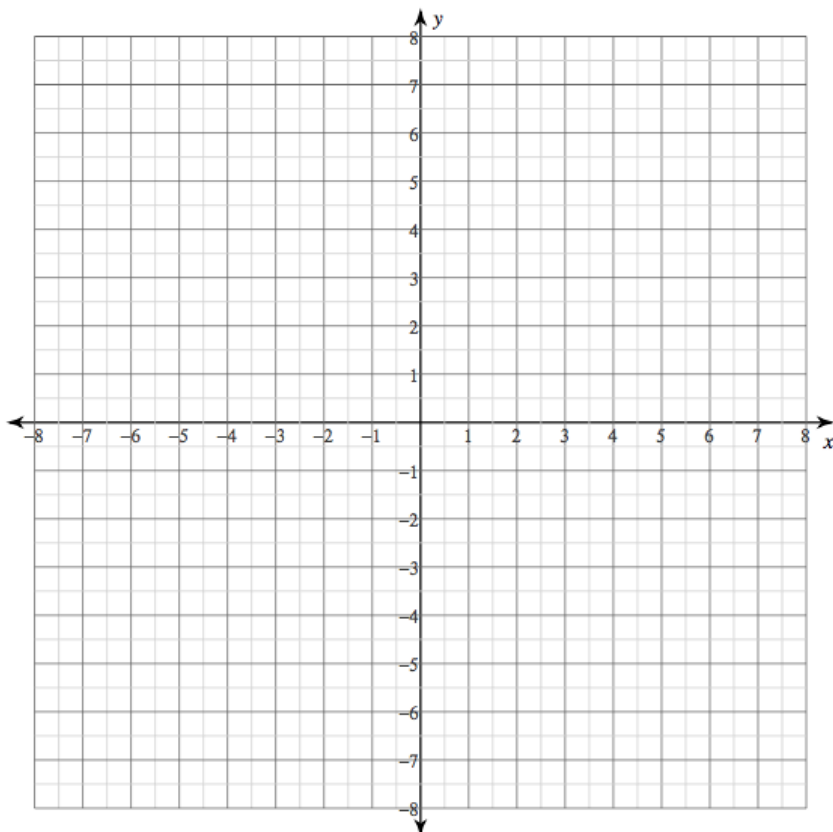
Part B Written Response

Please show all working for full credit. All questions in this part are worth 5 marks each.

1. A polynomial with a positive leading coefficient and zeros of $x = 1$ (multiplicity 2), and $x = -2$ (multiplicity 2). This polynomial function has a y -intercept of 8.

a) Write an equation that models the criteria above.

b) Sketch the graph of the above information.



2. If $\csc A = -4$, solve $\sec A$ exactly for each of the following:

a) $\tan > 0$

b) $-\frac{\pi}{2} \leq A < \frac{\pi}{2}$

3.

In a population of moths, 78 moths increase to 1000 moths in 40 weeks. What is the doubling time for this population of moths?

(Solve algebraically using logarithms. Answer accurate to at least 2 decimal places.)

4.

Prove the identity:

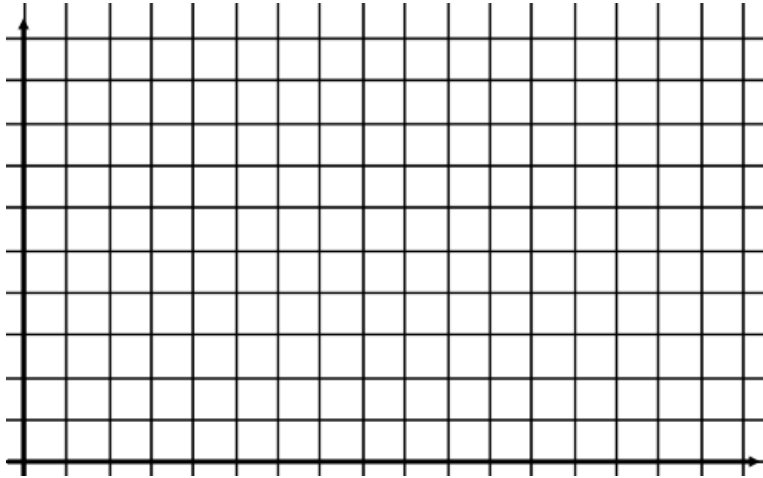
$$\frac{\tan x(\cos x + \cot x)}{\sec x + \tan x} = \frac{\sin x \sin 2x}{2 - 2\cos^2 x}$$

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5. The average depth of water at the end of a dock is 6 meters. This varies 2 meters in both directions.

Suppose there is a high tide at 4 am and the tide goes from low to high every 6 hours.

a) Sketch and label the function modelled above.



b) Write a cosine function $d(t)$ describing the depth of the water as a function of time.

c) Using algebra find the depth at 1 pm.