Name: _____

Instructor: _____

Math 10560, Practice for Quiz 1
August 22, 2023

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- No calculators.
- The quiz lasts for 25 Minutes .
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 6 pages of the test.

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

1.	(a)	(b)	(c)	(d)	(e)
2.	(a)	(b)	(c)	(d)	(e)
3.	(a)	(b)	(c)	(d)	(e)
4.	(a)	(b)	(c)	(d)	(e)
5.	(a)	(b)	(c)	(d)	(e)

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Multiple Choice

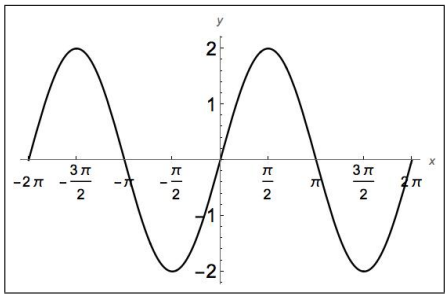
1.(2 pts) If $f(x) = \cos(x)$ and $g(x) = x - \dfrac{\pi}{2}$, which of the following is the graph of $y = 2f(g(x))$?
(Make sure you look carefully at the labels on both axes.)

We are given, $f(x) = \cos x$ and $g(x) = x - \dfrac{\pi}{2}$. So,

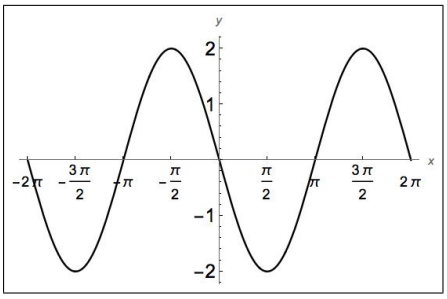
$$2f(g(x)) = 2\cos\left(x - \frac{\pi}{2}\right) = 2sin(x).$$

The graph of $2f(g(x))$ will be the graph of $\sin(x)$ but multiplied by 2.

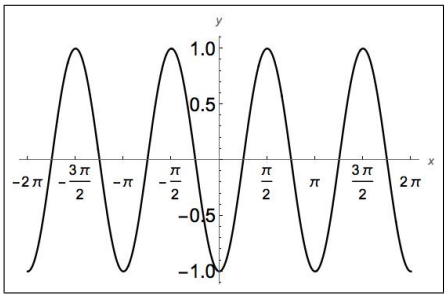
(a)



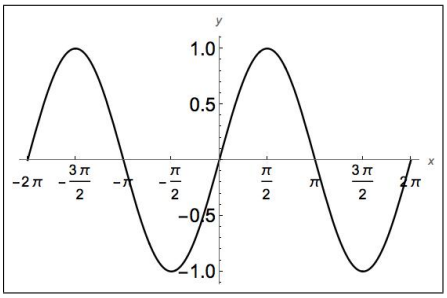
(b)



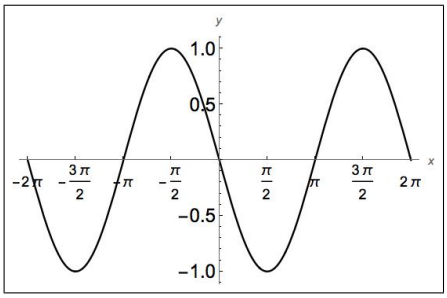
(c)



(d)



(e)



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2.(2 pts) What is the value of

$$\cos\left(\frac{7\pi}{6}\right)$$

$$\cos\left(\frac{7\pi}{6}\right) = \cos\left(\pi + \frac{\pi}{6}\right) = -\cos\frac{\pi}{6} = -\frac{\sqrt{3}}{2}$$

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{2}$ (c) $-\frac{1}{2}$ (d) $-\frac{\sqrt{3}}{2}$ (e) $-\frac{1}{\sqrt{3}}$

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3.(2 pts) Let $f(x) = \dfrac{1}{x-2}$ and $g(x) = \dfrac{1}{x-3}$. What is the domain of the function $f \circ g(x)$?

We want to know the domain of $f \circ g(x) = f(g(x))$. Firstly, the denominator of g should be non-zero, i.e $x \neq 3$.
Similarly, the denominator of $f(g(x))$ cannot be zero, i.e $g(x) \neq 2$. If $g(x) = 2$, or $\dfrac{1}{x-3} = 2$ or $x = \dfrac{7}{2}$.
Hence,

$$\{x | x \neq 3 \text{ and } x \neq 7/2\} = (-\infty, 3) \cup (3, 7/2) \cup (7/2, \infty).$$

(a) $\{x | x \neq 3\} = (-\infty, 3) \cup (3, \infty)$

(b) $\{x | x \neq 2\} = (-\infty, 2) \cup (2, \infty)$

(c) $\{x | x \neq 3 \text{ and } x \neq 7/2\} = (-\infty, 3) \cup (3, 7/2) \cup (7/2, \infty)$

(d) $\{x | x \neq 3 \text{ and } x \neq 2\} = (-\infty, 2) \cup (2, 3) \cup (3, \infty)$

(e) $\{\text{all values of } x\} = (-\infty, \infty)$

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4.(2 pts) The following table shows the position, $s(t)$, at time t, of a particle moving on an axis, where t is measured in seconds and distance is measured in feet.

t	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1
$s(t)$	1	-3	1	0	1	-1	-4	4	3	2	1	0

Which of the following is the most reasonable estimate of the velocity of the particle, $v(t)$, at time $t = 1$ second given the data available?

To estimate the velocity at $t = 1$ we compute $\dfrac{s(1+h) - s(1)}{h}$, for $1 + h$ close to 1 from the given data.
Note that $\dfrac{s(1+h) - s(1)}{h} = -10$ ft/s for $h = 0.1, -0.1, -0.2, -0.3$ (corresponding to $t = 1.1, 0.9, 0.8, 0.7$). Hence, -10 ft/sec is the most reasonable estimate for the velocity of the particle.

(a) $v(1) \approx -10$ ft/sec (b) $v(1) \approx 1$ ft/sec (c) $v(1) \approx 10$ ft/sec

(d) $v(1) \approx 100$ ft/sec (e) $v(1) \approx -1$ ft/sec

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5.(2 pts) The height of a particle moving along a vertical axis is given by $H(t) = \sin\left(\frac{\pi t}{6}\right)$ feet, where t is measured in seconds. What is the average speed of the particle in the first 2 seconds i.e. over the time interval $0 \leq t \leq 2$.

The average speed over the time interval $0 \leq t \leq 2$ will be slope of the secant line joining $t = 0$ and $t = 2$. Therefore the average speed is

$$\frac{H(2) - H(0)}{2 - 0} = \frac{\sin\left(\frac{2\pi}{6}\right) - \sin 0}{2} = \frac{\sqrt{3}}{4}.$$

(a) $\frac{1}{4}$ ft/sec (b) $\frac{1}{2\sqrt{2}}$ ft/sec (c) $\frac{\sqrt{3}}{2}$ ft/sec

(d) $\frac{\sqrt{3}}{4}$ ft/sec (e) $\frac{\sqrt{1}}{2}$ ft/sec

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