

WRITE ALL YOUR RESPONSES ON YOUR ANSWER SHEETS.

- A) FOR THE **MULTIPLE CHOICE** ITEMS, YOU DO NOT NEED TO SHOW YOUR WORK, **USE ONLY CAPITAL LETTERS** AND YOU DO NOT NEED TO PUT A BOX AROUND YOUR FINAL RESULT.
B) FOR THE **SHORT ANSWER** ITEMS, YOU DO NOT NEED TO SHOW YOUR WORK, AND YOU DO NOT NEED TO PUT A BOX AROUND YOUR FINAL RESULT.

- C) FOR THE **FREE RESPONSE** ITEMS, SHOW **ALL** YOUR WORK NEATLY.

USE AS MANY EXTRA SHEETS AS REQUIRED, AND **DRAW A BOX AROUND** YOUR FINAL ANSWER.

- D) YOU MAY USE A CALCULATOR, YOUR NOTES, AND THE TEXTBOOK.

YOU MUST SUBMIT PICTURES OF ALL YOUR **ANSWER SHEETS** NO LATER THAN **1:15pm HOUSTON TIME** TODAY. SEND THE PICTURES OF YOUR ANSWER SHEETS AS ATTACHMENTS IN AN EMAIL TO THE ADDRESS:

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THERE ARE SEVENTEEN (17) MULTIPLE CHOICE ITEMS ON THE EXAM.

THERE ARE FIVE (5) SHORT ANSWER ITEMS ON THE EXAM.

THERE ARE FOUR (4) FREE RESPONSE ITEMS ON THE EXAM

TOTAL NUMBER OF ITEMS IS 25.

1. WHEN SOLVING A TRIGONOMETRIC EQUATION IN THE INTERVAL $[0, 2\pi)$ THE RESULT OF THE QUADRANT CHECK IS QII & QIII AND THE REFERENCE ANGLE IS $x_R = \pi/3$. WHAT ARE THE SOLUTIONS?

- A. $x = 2\pi/3$ & $x = 5\pi/3$ B. $x = 2\pi/3$ & $x = 4\pi/3$ C. $x = 4\pi/3$ & $x = 5\pi/3$
D. $x = \pi/3$ & $x = 4\pi/3$ E. NONE OF THESE

2. WHEN SOLVING THE TRIGONOMETRIC EQUATION IN THE INTERVAL $[0, 2\pi)$, THE RESULT OF THE QUADRANT CHECK IS QII & QIII AND THE **SOLUTIONS** ARE $x = 5\pi/6$ & $x = 7\pi/6$. WHAT IS THE REFERENCE ANGLE WHICH PRODUCES THESE SOLUTIONS?

- A. $x_R = \pi/3$ B. $x_R = \pi/2$ C. $x_R = \pi/6$ D. $x_R = \pi/4$ E. NONE OF THESE

3. WHAT IS THE RESULT OF THE QUADRANT CHECK WHEN SOLVING THE EQUATION

$$2 \cos(x) + 1 = 0.$$

- A. QI & QII B. QIII & QIII C. QII & QIII D. ALL 4 QUADRANTS E. NONE OF THESE

4. WHEN SOLVING THE EQUATION $4 \cos^2(x) - 3 = 0$ WHAT IS THE RESULT OF THE QUADRANT CHECK?

- A. ALL 4 QUADRANTS B. QI & QII C. QIII & QIII D. QII & QIII E. NONE OF THESE

5. WHEN SOLVING THE EQUATION $10 \cos^2(x) - 5 = 0$ WHAT IS THE REFERENCE ANGLE?

A. $x_R = \pi/6$ B. $x_R = \pi/4$ C. $x_R = \pi/3$

D. THIS EQUATION REQUIRES NO REFERENCE ANGLE E. NONE OF THESE

6. WHAT IS THE RESULT OF THE QUADRANT CHECK WHEN SOLVING THE EQUATION

$$-\sqrt{2} \sin(x) = 1.$$

A. QIII & QIII B. QI & QII C. QII & QIII D. NO QUADRANT CHECK IS NEEDED

E. NONE OF THESE

7. WHAT IS THE RESULT OF THE QUADRANT CHECK WHEN SOLVING THE EQUATION

$$\tan^2(x) + 1 = 1.$$

A. QI & QIII B. QII & QIII C. ALL 4 QUADRANTS

D. NO QUADRANT CHECK IS REQUIRED E. NONE OF THESE

8. WHICH OF THE FOLLOWING EQUATIONS ON THE INTERVAL $[0, 2\pi)$ **DOES** REQUIRE A QUADRANT CHECK WHEN SOLVING?

A. $\sin(x) - 1 = 0$ B. $\sin(x) = 0$ C. $\tan(x) + 1 = 0$ D. $\cos(x) + 1 = 0$

E. NONE OF THESE

9. FOR WHICH PAIR OF FUNCTIONS IS THE **RANGE** OF $f(x)$ THE SAME AS THE RANGE OF $g(x)$?

A. $f(x) = \sin(x)$ & $g(x) = \csc(x)$ B. $f(x) = \cot(x)$ & $g(x) = \tan(x)$

C. $f(x) = \cot(x)$ & $g(x) = \cos(x)$ D. $f(x) = \cos(x)$ & $g(x) = \sec(x)$

E. NONE OF THESE

10. WHAT IS THE VERTICAL SHIFT OF THE FUNCTION $f(x) = 2 \sin(x) - 2$?

A. SHIFT DOWN 2 B. SHIFT UP 2 C. SHIFT LEFT 2 D. SHIFT RIGHT 2 E. NONE OF THESE

11. WHAT IS THE PERIOD OF THE FUNCTION $f(x) = \sin(2x)$?

A. π B. 4π C. 2 D. 2π E. NONE OF THESE

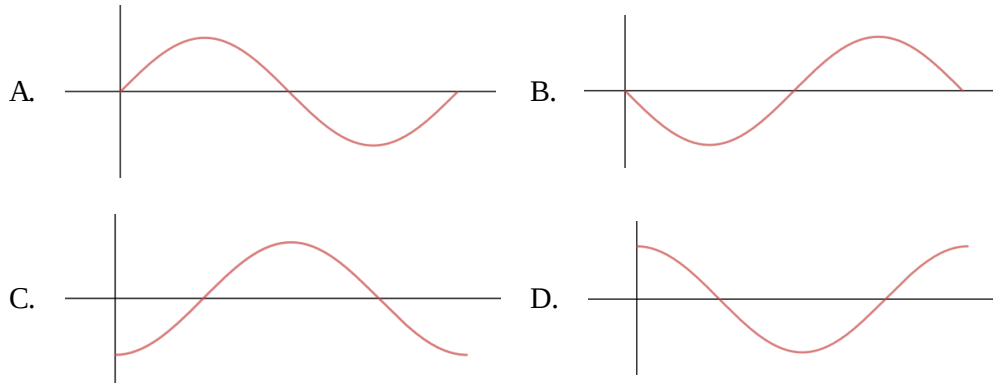
12. WHAT IS THE PERIOD OF THE FUNCTION $f(x) = \tan(2x)$?

A. $\pi/4$ B. $\pi/2$ C. π D. 2π E. NONE OF THESE

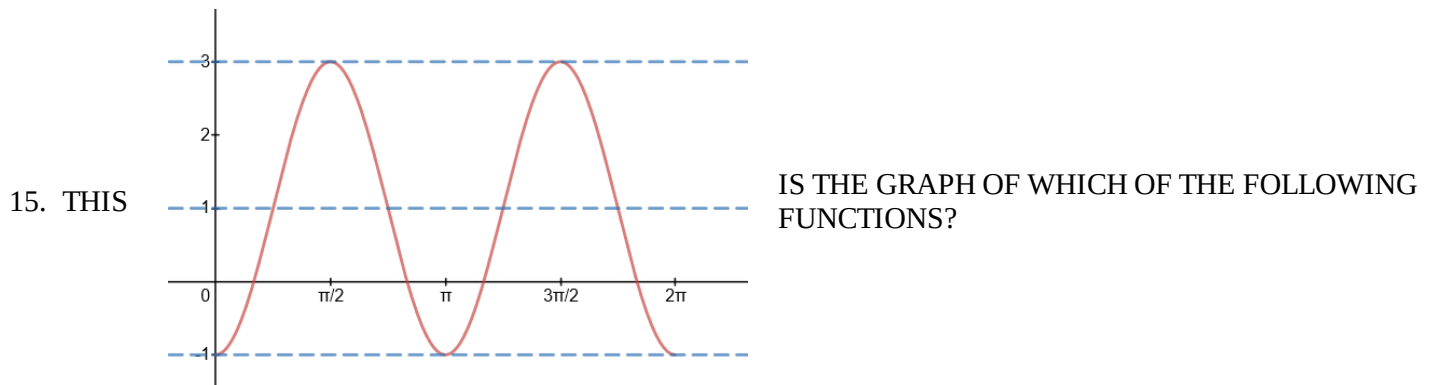
13. WHAT IS THE AMPLITUDE OF THE GRAPH OF THE FUNCTION $f(x) = -2 \sin(-3x)$

A. $|-3|$ B. -3 C. $|-2|$ D. -2 E. NONE OF THESE

14. WHICH OF THESE IS A SKETCH OF ONE PERIOD OF THE GRAPH OF THE FUNCTION $f(x) = -\sin(x)$?



E. NONE OF THESE



- A. $f(x) = 2\sin(x) + 1$ B. $f(x) = 2\sin(2x) + 1$
 C. $f(x) = -2\cos(2x) + 1$ D. $f(x) = 2\cos(2x) + 1$
 E. NONE OF THESE

16. WHAT IS THE PERIOD OF THE FUNCTION $f(x) = \cos(x)$?

- A. π B. 4π C. 2 D. 2π E. NONE OF THESE

17. FOR WHICH PAIR OF FUNCTIONS DO THE GRAPHS OF NEITHER $f(x)$ NOR $g(x)$ CONTAIN VERTICAL ASYMPTOTES?

- A. $f(x) = \cot(x)$ & $g(x) = \tan(x)$ B. $f(x) = \cos(x)$ & $g(x) = \sec(x)$
 C. $f(x) = \cos(x)$ & $g(x) = \sin(x)$ D. $f(x) = \sec(x)$ & $g(x) = \csc(x)$
 E. NONE OF THESE

II. SHORT ANSWER: WRITE YOUR RESPONSE ON A BLANK ON THE ANSWER SHEET. (IF NEEDED, MAKE THE LINE A BIT LONGER.)

18. IF IN THE EXPRESSION $\frac{\cos(x) \cot(x) \sec^2(x)}{\csc(x)}$ YOU EXPRESS ALL FUNCTIONS IN TERMS OF SINE AND COSINE AND SIMPLIFY, WHAT IS THE RESULT?

19. IF TWO DIFFERENT SIZED GEARS ARE FIXED WITH THE SAME CENTER, AND THE SMALLER ONE ROTATES THROUGH AN ANGLE OF $4\pi/3$ RADIANS THROUGH WHAT ANGLE DOES THE LARGER OF THE TWO GEARS ROTATE?

20. WHEN SOLVING A TRIGONOMETRIC EQUATION IN THE INTERVAL $[0, 2\pi)$ THE RESULT OF THE QUADRANT CHECK IS QIII & QIII AND THE REFERENCE ANGLE IS $x_R = \pi/3$. WHAT ARE THE SOLUTIONS?

21. WHAT IS THE RANGE OF THE FUNCTION $f(x) = \tan(2x)$?

22. WHAT IS THE DOMAIN OF THE FUNCTION $f(x) = \cos\left(x - \pi/2\right)$?

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III. FREE RESPONSE: FOR EACH OF THE FOLLOWING ITEMS YOU MUST SHOW YOUR WORK NEATLY AND COMPLETELY AS DEMONSTRATED IN THE VIDEO LESSONS.

DRAW A BOX AROUND YOUR FINAL ANSWER.

USE AS MANY EXTRA SHEETS AS NEEDED. YOUR WORK MUST BE NEAT, READABLE, AND USE ONLY METHODS DISCUSSED ON THE VIDEO LESSONS.

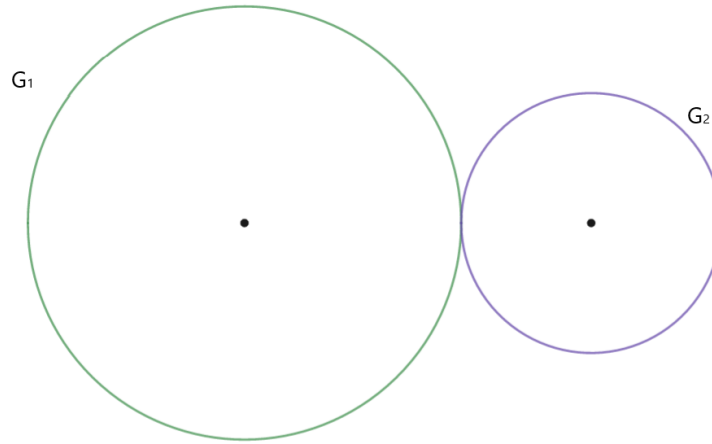
IF YOU DO NOT SHOW ALL YOUR WORK IN A NEAT AND ORDERLY FASHION, OR **IF YOU USE METHODS OTHER THAN THOSE DISCUSSED ON THE VIDEO LESSONS**, OR IF YOU DO NOT FOLLOW DIRECTIONS, YOU FORFEIT YOUR CLAIM TO ANY CREDIT.

24. WHEN YOU SOLVE THE EQUATION $-8\sin(x) + 1 = -3$ IN THE INTERVAL $[0, 2\pi)$ THERE ARE TWO SOLUTIONS. ONE OF THE SOLUTIONS IS IN QUADRANT I. WHAT IS THE **VALUE** OF THE OTHER SOLUTION?

25. SOLVE THE EQUATION $\sqrt{2} \sin(x) \cos(x) = -\cos(x)$ ON THE INTERVAL $[0, 2\pi)$.

26. SOLVE THE EQUATION $2\sin^2(x) - \sin(x) - 1 = 0$ ON THE INTERVAL $[0, 2\pi)$.

28. IN THE FIGURE BELOW TWO GEARS, G_1 , GREEN, AND G_2 , PURPLE, TOUCH SO THAT AS ONE TURNS THE OTHER DOES AS WELL. THE RADII ARE $r_1 = 27.7\text{cm}$ AND $r_2 = 19.1\text{cm}$. IF G_2 ROTATES THROUGH AN ANGLE OF 240 DEGREES, THROUGH HOW MANY DEGREES DOES G_1 ROTATE? STATE YOUR ANSWER IN DEGREES AND ROUND IT TO ONE DECIMAL PLACE.



AT THE BOTTOM OF THE LAST PAGES OF YOUR ANSWER SHEETS PRINT NEATLY THE FOLLOWING STATEMENT AND SIGN IT:

“On my honor I have neither given nor received improper assistance on this exam.”