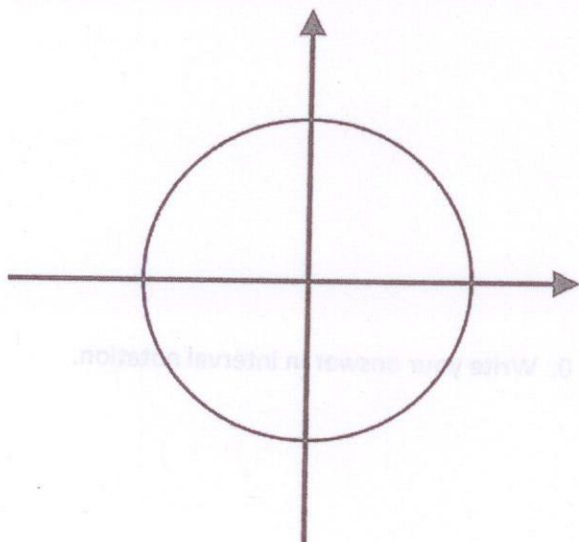


Part I: The following ten questions are worth 6 points each. Show all work for full credit.

1. If $f(x) = -2x^2 + 6x - 5$ and $g(x) = 3x + 7$, compute and simplify $f \circ g(x)$.

2. If $t = -\frac{5\pi}{3}$,

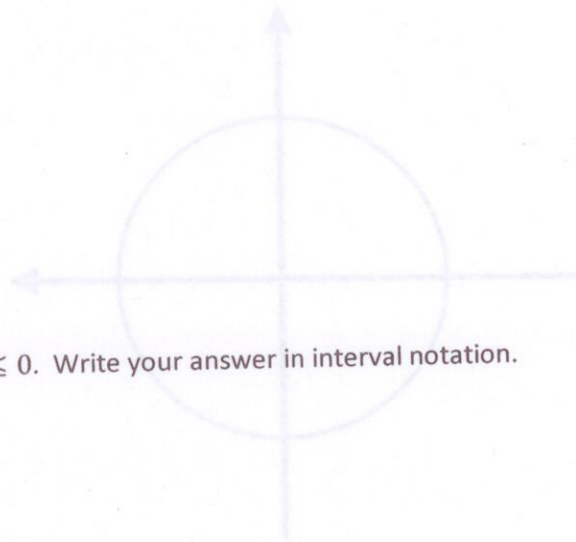
- (a) Draw the terminal point on the unit circle and find the reference number for t .
- (b) Find the exact value of $\sin t$, $\cos t$ and $\tan t$.



3. If $\tan t = -3$ and $\sin t > 0$, find the exact value of $\cos t$.

4. Find the domain of $f(x) = \frac{x+4}{\sqrt{3x-2}}$.

5. Solve the inequality $x^2 - 8x + 12 \leq 0$. Write your answer in interval notation.



6. Prove the identity: $\frac{\cot x}{\csc x} = \cos x$

7. Sketch one period of the graph $y = -5 \sin\left(2x + \frac{\pi}{3}\right)$. Be sure to label the highest points, the lowest points and the x-intercepts of the graph with their coordinates.

8. A triangle has the following sides: $a = 20 \text{ ft.}$, $b = 30 \text{ ft.}$, $c = 40 \text{ ft.}$ Find the measure of its largest angle only (round to the nearest tenth).

9. If $\sin x = -\frac{12}{13}$ and x is in quadrant III, find the exact value of $\tan 2x$. Write your answer as a fraction.

10. (a) Simplify: $\cos\left(\tan^{-1}\frac{1}{x}\right)$

(b) Find the exact value of $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

Part II: The next five questions are worth 8 points each. Show all work for full credit.

11. If $f(x) = \frac{9x^2-4}{x^2-1}$, find:

- (a) the coordinates of the x-intercept(s): _____
- (b) the coordinates of the y-intercept: _____
- (c) the equation of the vertical asymptote(s): _____
- (d) the equation of the horizontal asymptote: _____
- (e) Sketch the graph of f together with all the points and lines found above:

12. Find all solutions for x in the interval $[0, 2\pi)$: $2 \sin^2 x + \sin x - 1 = 0$

13. If $f(x) = x^3 + 2x^2 - 5x + 12$

(a) Give a complete list of all possible rational zeroes:

(b) Use synthetic division to check for the actual rational zeroes:

(c) Find all remaining zeroes:

(d) Write f as a product of linear factors:

$$f(x) = \underline{\hspace{10cm}}$$

14. If $y = 3x^2 - 12x + 15$,

(a) Rewrite the function in the form $y = c(x - h)^2 + k$

(b) Use part (a) to find the vertex of the graph.

(c) Find the x-intercepts and the y-intercept of the graph.

15. A surveyor is measuring a building with an eyepiece 6 feet from the ground. From where the surveyor is looking, the angle of elevation to the top of the building is 19° ; the angle of depression to the foot of the building is 5° . What is the height of the building to the nearest foot?

height = _____

