

KEY

Q4 - Review C

Solve for x.

1. $\frac{2}{x+3} + \frac{x}{x-1} = \frac{3}{x^2+2x-3}$
 $(x+3)(x-1)$

LCD = $(x+3)(x-1)$
 $2(x-1) + x(x+3) = 3$
 $2x-2 + x^2+3x-3 = 0$
 $x^2+5x-5 = 0$

$x = \frac{-5 \pm \sqrt{25-4(-5)}}{2}$

$x = \frac{-5 \pm \sqrt{45-9}}{2}$

$x = \frac{-5 \pm 3\sqrt{5}}{2}$

3. $x^2+2 < 0$



no solution

Simplify the expression.

5. $\frac{3x^7y^2}{9xy^{-4}} \cdot \frac{12x^{-1}y^0}{3xy^6}$

$\frac{1x^6y^6}{3} \cdot \frac{4}{1x^2y^6} = \frac{4x^4y^0}{3} = \frac{4x^4}{3}$

Write the quadratic in vertex form.

6. $y = x^2 + 8x + 10$

$y = (x^2 + 8x + 16) + 10 - 16$

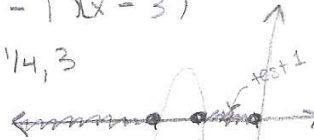
$y = (x+4)^2 - 6$

2. $4x^3 - 8x^2 + 3x \leq 0$

$x(4x^2 - 8x + 3) = 0$

$x(4x-1)(x-3)$

$x = 0, \frac{1}{4}, 3$



$4(1)^3 - 8(1)^2 + 3(1) \leq 0$
 $4 - 8 + 3$
 $-1 \leq 0$
 TRUE

$(-\infty, 0] \cup [\frac{1}{4}, 3]$

4. $|6x+5| - 3 > 7$

$|6x+5| > 10$

$6x+5 > 10$

$6x > 5$

$x > \frac{5}{6}$

$6x+5 < -10$

$6x < -15$

$x < -\frac{15}{6}$

$x < -\frac{5}{2}$

8. Find the absolute max. (with a calc)

$f(x) = -2x^4 + 5x^3 - 2x + 3$

7.565

9. Convert from radians to degrees.

$\frac{5\pi}{4} \cdot \frac{180}{\pi} = 225^\circ$

10. Convert from degrees to radians.

$300^\circ \cdot \frac{\pi}{180} = \frac{5\pi}{3}$

Evaluate the expression exactly without a calculator.

11. $\sin 30^\circ = \frac{1}{2}$

12. $\tan(-135^\circ) = -1$

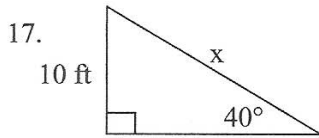
13. $\sin \frac{5\pi}{6} = \frac{1}{2}$

14. $\sec\left(-\frac{\pi}{3}\right) = 2$
 $\cos\left(-\frac{\pi}{3}\right) = \frac{1}{2}$ flip

15. $\csc 270^\circ = -1$
 $\sin 270^\circ = -1$ flip

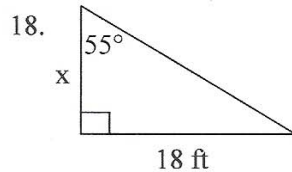
16. $\cot(-90^\circ) = \frac{0}{7} = 0$
 $\tan(-90^\circ) = -\frac{1}{0}$

Find the missing side of each triangle.



$\sin 40^\circ = \frac{10}{x}$

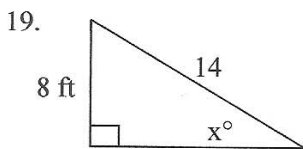
$x = \frac{10}{\sin 40} \approx 15.558$



$\tan 55 = \frac{18}{x}$

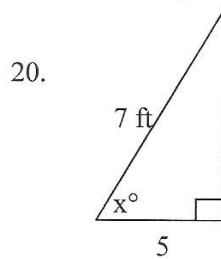
$x = \frac{18}{\tan 55} \approx 12.604$

Find the missing angle of each triangle.



$\sin x = \frac{8}{14}$

$x = \sin^{-1}\left(\frac{8}{14}\right) \approx 34.8^\circ$



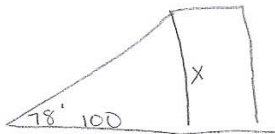
$\cos x = \frac{5}{7}$ $x = \cos^{-1}\left(\frac{5}{7}\right) \approx 44.4^\circ$

21. Find the length of the arc intercepted by a central angle of $2\pi/3$ rad in a circle with radius 2.

$s = r\theta$

$s = 2 \cdot \frac{2\pi}{3} = \frac{4\pi}{3}$

22. The angle of elevation of the top of a building from a point 100 m away from the building on level ground is 78° . Find the height of the building.

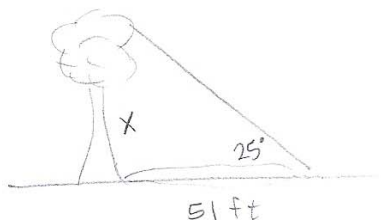


$\tan 78 = \frac{x}{100}$

$x = 100 \tan 78^\circ$

$x \approx 470.463 \text{ m}$

23. A tree casts a shadow 51 feet long when the angle of elevation of the sun (measured with the horizon) is 25° . How tall is the tree?



$\tan 25 = \frac{x}{51}$

$x = 51 \cdot \tan 25^\circ$

$x \approx 23.782 \text{ ft}$

Simplify each trig expression.

24. $\cot x \tan x$

$$\frac{\cos x}{\sin x} \cdot \frac{\sin x}{\cos x} = \boxed{1}$$

25. $\sec^2(-x) - \tan^2 x$

$$\begin{aligned} & (\sec(-x))^2 - \tan^2 x \\ & (\sec x)^2 \\ & \sec^2 x - \tan^2 x = \boxed{1} \end{aligned}$$

26. $\frac{1}{\sin^2 x} + \frac{\sec^2 x}{\tan^2 x}$

$$\frac{1}{\sin^2 x} + \frac{\frac{1}{\cos^2 x}}{\frac{\sin^2 x}{\cos^2 x}} = \frac{1}{\cos^2 x} \cdot \frac{\cos^2 x}{\sin^2 x}$$

$$\frac{1}{\sin^2 x} + \frac{1}{\sin^2 x} = \frac{2}{\sin^2 x} = \boxed{2 \csc^2 x}$$

27. $\tan^2 x \cos^2 x + \cot^2 x \sin^2 x$

$$\frac{\sin^2 x}{\cos^2 x} \cdot \cos^2 x + \frac{\cos^2 x}{\sin^2 x} \cdot \sin^2 x$$

$$\sin^2 x + \cos^2 x = \boxed{1}$$

28. $\cos x + \sin x \tan x$

$$\cos x + \sin x \cdot \frac{\sin x}{\cos x}$$

$$\frac{\cos^2 x}{\cos x} + \frac{\sin^2 x}{\cos x} = \frac{1}{\cos x} = \boxed{\sec x}$$

29. $\cos x - \cos x \sin^2 x$

$$\cos x (1 - \sin^2 x)$$

$$\cos x (\cos^2 x)$$

$$\boxed{\cos^3 x}$$

Solve each trig equation from $[0, 2\pi)$

30. $2 \sin x - 1 = 0$

$$\sin x = \frac{1}{2}$$

$$\boxed{x = \frac{\pi}{6}, \frac{5\pi}{6}}$$

31. $\tan^2 x = 3$

$$\tan x = \pm \sqrt{3}$$

$$\boxed{x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}}$$

32. $2 \cos^2 x - \cos x = 0$

$$\cos x (2 \cos x - 1) = 0$$

$$\cos x = 0 \quad \cos x = \frac{1}{2}$$

$$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, \frac{5\pi}{3}}$$

33. $2 \sin^2 x + 3 \sin x + 1 = 0$

$$(2 \sin x + 1)(\sin x + 1) = 0$$

$$\sin x = -\frac{1}{2} \quad \sin x = -1$$

$$\boxed{x = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2}}$$

34. $\sin x \tan^2 x = \sin x$

$$\sin x \tan^2 x - \sin x = 0$$

$$\sin x (\tan^2 x - 1) = 0$$

$$\sin x = 0 \quad \tan^2 x = 1$$

$$\tan x = \pm 1$$

$$\boxed{x = 0, \pi, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}}$$