Find the real zeros of the function. List the x-intercepts of the graph of the function.

54) $Q(x) = (-7x - 5)^2 + 10(-7x - 5) + 24$

$0 = [(-7x-5) + 6][(-7x-5) + 4]$

$0 = (-7x+1)(-7x-1)$

$-7x+1 = 0$ or $-7x-1 = 0$

$-7x = -1$ $\quad -7x = 1$

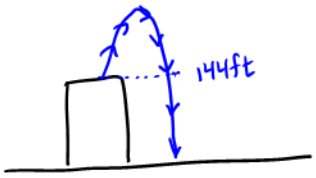
$x = \frac{1}{7}$ $\quad x = -\frac{1}{7}$

Zeros: $\{-\frac{1}{7}, \frac{1}{7}\}$

x-intercepts: $(-\frac{1}{7}, 0)$ and $(\frac{1}{7}, 0)$

Solve the problem.

55) A ball is thrown vertically upward from the top of a building 144 feet tall with an initial velocity of 128 feet per second. The distance s (in feet) of the ball from the ground after t seconds is $s = 144 + 128t - 16t^2$. After how many seconds will the ball pass the top of the building on its way down?



Let $S = 144$

$144 = 144 + 128t - 16t^2$

$0 = -16t(9 - t)$

$-16t = 0$ or $9 - t = 0$

$t = 0$ $\quad t = 9$

The ball will pass the top of the building after 9 seconds

Solve the equation on the interval $0 \le \theta < 2\pi$.

110) $\csc^5 \theta - 4 \csc \theta = 0$

$\csc\theta(\csc^4\theta - 4) = 0$

$\csc\theta(\csc^2\theta - 2)(\csc^2\theta + 2) = 0$

$\csc\theta = 0$ or $\csc^2\theta - 2 = 0$ or $\csc^2\theta + 2 = 0$

$0 \notin$ of range

$\csc^2\theta = 2$

$\csc\theta = \pm\sqrt{2}$

$\csc^2\theta = -2$

not real

$\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

$\left\{\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}\right\}$

Solve the problem.

115) A new homeowner has a triangular-shaped back yard. Two of the three sides measure 65 ft and 80 ft and form an included angle of 125°. The owner wants to approximate the area of the yard, so that he can determine the amount of fertilizer and grass seed to be purchased. Find the area of the yard rounded to the nearest square foot.

(SAS area formula)

$A = \frac{1}{2}(65)(80)\sin 125°$

$A \approx 2130 \text{ ft}^2$

Solve the equation on the interval $0 \le \theta < 2\pi$. → $0 \le 2\theta < 4\pi$

114) $\cos(2\theta) = \sqrt{2} - \cos(2\theta)$

$2\cos 2\theta = \sqrt{2}$

$\cos 2\theta = \frac{\sqrt{2}}{2}$

$2\theta = \frac{\pi}{4}, \frac{7\pi}{4}, \frac{9\pi}{4}, \frac{15\pi}{4}$

$\theta = \frac{\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{15\pi}{8}$

$\left\{\frac{\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{15\pi}{8}\right\}$

119) $\dfrac{\dfrac{x^3}{x^2-4}}{\dfrac{x^3-9x^2}{x^2+7x-18}} = \dfrac{x^3}{x^2-4} \div \dfrac{x^2+7x-18}{x^3-9x^2}$

$= \dfrac{x^3}{(x+2)(x-2)} \cdot \dfrac{x^2(x-9)}{(x+9)(x-2)}$

$= \boxed{\dfrac{x^5(x-9)}{(x+2)(x+9)(x-2)^2}}$

122) $\dfrac{1}{x+7} + \dfrac{4}{x+5} = \dfrac{-2}{x^2+12x+35}$

$(x+7)(x+5)\left(\dfrac{1}{x+7} + \dfrac{4}{x+5}\right) = \left(\dfrac{-2}{(x+7)(x+5)}\right)(x+7)(x+5)$

$x+5+4(x+7) = -2$

$x+5+4x+28 = -2$

$5x = -2-33$

$5x = -35$

$x = -7$

but $-7 \notin$ of the domain so $\boxed{\{\} \text{ or } \emptyset}$