

**No Calculators Allowed**

1. Let  $f(x) = 3\sec(x) - 2$  and  $g(x) = 4$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of intersection of the graphs of  $f$  and  $g$  for  $0 \leq x < 2\pi$ ?

$$3\sec(x) - 2 = 4 \quad 3\sec(x) = 6 \quad \sec(x) = 2 \quad \frac{1}{\cos(x)} = 2 \quad \cos(x) = \frac{1}{2} \quad x = \frac{\pi}{3}, \frac{5\pi}{3}$$

2. Let  $h(x) = 5 - 2\csc x$  and  $k(x) = 7$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of intersection of the graphs of  $h$  and  $k$  for  $0 \leq x < 2\pi$ ?

$$5 - 2\csc x = 7 \quad -2\csc x = 2 \quad \csc x = -1 \quad \frac{1}{\sin x} = -1 \quad \sin x = -1 \quad x = \frac{3\pi}{2}$$

3. Let  $m(x) = 2 + \sqrt{3}\cot x$  and  $p(x) = 1$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of intersection of the graphs of  $m$  and  $p$  for  $0 \leq x < 2\pi$ ?

$$2 + \sqrt{3}\cot x = 1 \quad \sqrt{3}\cot x = -1 \quad \cot x = -\frac{1}{\sqrt{3}} \quad \tan x = -\sqrt{3} \quad x = \frac{2\pi}{3}, \frac{5\pi}{3}$$

4. Let  $f(x) = 3\csc^2(x) - 1$  and  $g(x) = 3$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of intersection of the graphs of  $f$  and  $g$  for  $0 \leq x < 2\pi$ ?

$$3\csc^2(x) - 1 = 3 \quad 3\csc^2(x) = 4 \quad \csc^2(x) = \frac{4}{3} \quad \csc x = \pm\frac{2}{\sqrt{3}} \quad \frac{1}{\sin x} = \pm\frac{2}{\sqrt{3}}$$

$$\sin x = \pm\frac{\sqrt{3}}{2} \quad x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

5. Let  $h(x) = 5 + \sqrt{3}\sec x$  and  $k(x) = 3$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of intersection of the graphs of  $h$  and  $k$  for  $0 \leq x < 2\pi$ ?

$$5 + \sqrt{3}\sec x = 3 \quad \sqrt{3}\sec x = -2 \quad \sec x = -\frac{2}{\sqrt{3}} \quad \frac{1}{\cos x} = -\frac{2}{\sqrt{3}} \quad \cos x = -\frac{\sqrt{3}}{2} \quad x = \frac{5\pi}{6}, \frac{7\pi}{6}$$

6. Let  $m(x) = 3 + 5\sec^2 x$  and  $p(x) = 13$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of intersection of the graphs of  $m$  and  $p$  for  $0 \leq x < 2\pi$ ?

$$3 + 5\sec^2 x = 13 \quad 5\sec^2 x = 10 \quad \sec^2 x = 2 \quad \sec x = \pm\sqrt{2} \quad \frac{1}{\cos x} = \pm\sqrt{2}$$

$$\cos x = \pm\frac{1}{\sqrt{2}} \quad x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

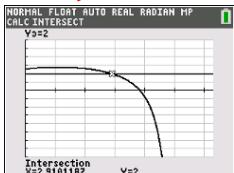
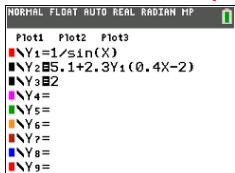
## Calculators Required



7. Let  $f(x) = 5.1 + 2.3 \csc(0.4x - 2)$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of where  $f(x) = 2$  for  $0 \leq x < 2\pi$ ?

$$5.1 + 2.3 \csc(0.4x - 2) = 2$$

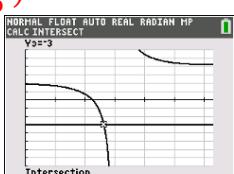
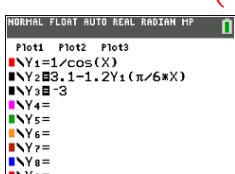
$$x = 2.9101 \dots$$



8. Let  $f(x) = 3.1 - 1.2 \sec\left(\frac{\pi x}{6}\right)$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of where  $f(x) = -3$  for  $0 \leq x < 2\pi$ ?

$$3.1 - 1.2 \sec\left(\frac{\pi x}{6}\right) = -3$$

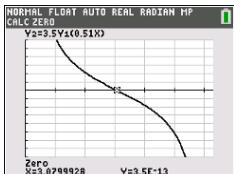
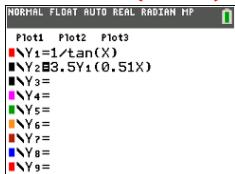
$$x = 2.6218 \dots$$



9. Let  $f(x) = 3.5 \cot(0.51x)$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the zeros of  $f(x)$  for  $0 \leq x < 2\pi$ ?

$$3.5 \cot(0.51x)$$

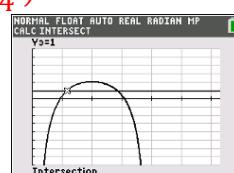
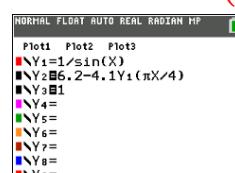
$$x = 3.0799 \dots$$



10. Let  $f(x) = 6.2 - 4.1 \csc\left(\frac{\pi x}{4}\right)$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of where  $f(x) = 1$  for  $0 \leq x < \pi$ ?

$$6.2 - 4.1 \csc\left(\frac{\pi x}{4}\right) = 1$$

$$x = 1.1564 \dots, 2.8435 \dots$$



11. Let  $f(x) = 2.1 + 2.7 \sec(3 - 0.4x)$ . In the  $xy$ -plane, what are the  $x$ -coordinates of the points of where  $f(x) = -5$  for  $0 \leq x < 2\pi$ ?

$$2.1 + 2.7 \sec(3 - 0.4x) = -5$$

$$x = 2.5977 \dots$$

