

## ADDITIONAL DISCRIMINANT EXERCISES

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All questions and solutions are written by Kyle Broder in 2017.

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**Q1.** Let  $f(x) := 2x + 1$  and  $g(x) = x^2 + k$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  intersects  $g$  exactly once.

**Q2.** Let  $f(x) := 4x + k$  and  $g(x) = 2x^2 - 3$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  intersects  $g$  exactly once.

**Q3.** Let  $f(x) := kx^2 - x$  and  $g(x) = x + 1$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  intersects  $g$  exactly once.

**Q4.** Let  $f(x) := kx + \frac{2}{3}$  and  $g(x) = 1 - kx^2$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  intersects  $g$  twice.

**Q5.** Let  $f(x) := kx + 1$  and  $g(x) = 2 + x^2$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  intersects  $g$  twice.

**Q6.** Let  $f(x) := 1 - kx^2$  and  $g(x) = 3kx$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  intersects  $g$  twice.

**Q7.** Let  $f(x) := 4 + 2x^2$  and  $g(x) = \frac{1}{k}x + 1$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  intersects  $g$  twice.

**Q8.** Let  $f(x) := x^2 - kx + 6$  and  $g(x) = x^2 + kx + 1$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  and  $g$  do not intersect.

**Q9.** Let  $f(x) := (x - 3)(x + k)$  and  $g(x) = 2x + 1$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  and  $g$  do not intersect.

**Q10.** Let  $f(x) := (kx + 1)^2$  and  $g(x) = 2kx - 5$ . Determine the value(s) of  $k \in \mathbb{R}$  such that  $f$  and  $g$  do not intersect.