CCNY, 20100 Calculus 1

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1a	$(-\infty, -4] \cup [1, +\infty)$
1b	$(-\sqrt{3}, \sqrt{3})$
1c	$\emptyset$ - never: discriminant is negative, hence there are no roots (in real numbers), hence parabola never intersects x-axis, i.e. it's completely above or below x-axis. Now we can pick any x and check wether parabola above or below x-axis.
2a	$\frac{1}{2}$
2b	$\frac{3}{2}$
2c	-2
2d	$y = -2x + 2$
3a	$(-5, 3)$ because the circle equation can be transformed to the form: $(x+5)^2 + (y-3)^2 = 36$
3b	6
3c	area inside this circle including circle itself
4a	$\sin\theta = \frac{1}{\sqrt{10}}$, $\cos\theta = -\frac{3}{\sqrt{10}}$, $\cot\theta = -3$
4b	I and II quadrants
5	$[-\frac{3}{2}, +\infty)$
6a	odd, $\sin(-x) = -\sin x$
6b	odd, $(-x) + \sin(-x) = -x - \sin x = -(x + \sin x)$
7a	transcendental: it's not algebraic because of log and not logarithmic because of x^2 hence transcendental
7b	trigonometric
7c	trigonometric

7d	rational
7e	algebraic
7f	exponential
8a	$f(x+3)$
8b	$f(-x)$
8c	$f(-x-12)$
8d	$f(x)-5$
8e	$-f(x)$
8f	$-f(x+2)$
8g	$-f(-x)$
8h	$\frac{f(x)}{2}$
8i	$f(\frac{x}{2})$
9a	2
9b	$+\infty$
9c	0
9d	does not exist
9e	-1
9f	2
9g	2
9h	2
9i	1
9j	1
9k	1
9l	1
10a	$+\infty$, 2^x approaches 1 from the right as x approaches 0 from the right, hence $\frac{1}{2^x}$ approaches 1 but always less than 1, i.e. approaches it from the left, therefore $1-\frac{1}{2^x}$ approaches 0 but remains positive hence whole functions approaches $+\infty$
10b	$-\infty$, reasoning is similar to reasoning in 10a
10c	does not exist
10d	not defined