I think that these problems represent the fundamentals which you should know. This is not an exhaustive set of problems; i.e. not all things which you should know are tested here. Some of the problems might be difficult. Enjoy!

I. Solve these inequalities:

1. $4 - 2x \leq 5$
2. $1 + 2x^2 < 5$
3. $\frac{2x-1}{x+2} > 1$
4. $|3 - 5x| \leq 2$
5. $|4x^2 - 7| > 2$
6. $3x - 2 < 7$
7. $\frac{3}{x} > 5$
8. $x^2 - 4 \leq 5$
9. $|3x - 2| < 7$
10. $|2x^2 + 5| \leq 6$
11. $|2x + 6| \leq 5$
12. $|x^2 - 4| \geq 5$
13. $|x^2 + 4| \geq 5$
14. $\frac{3x+5}{4x-2} < 3$
15. $\frac{1}{x+2} - \frac{1}{x-2} < 5$
16. $|x^2 + 2x - 3| \leq 1$
17. $\frac{x+5}{x-3} < \frac{x+2}{x+1}$
18. $\frac{2x+3}{x-5} > x + 4$

II. Express the given angle in radians.

30°	-300°
321°	60°
765°	135°
72°	213°
270°	-90°
-120°	

III. Express the given angle in degrees.

$\pi/3$	$-5\pi/6$
-3.6	$-5\pi/4$
1	11
$3\pi/2$	8π

IV. Evaluate:

$\sin 0$	$\cos \pi/6$
$\tan \pi/4$	$\csc \pi/3$
$\sec \pi/2$	$\cot 2\pi/3$
$\sin 3\pi/4$	$\cos 5\pi/6$
$\tan \pi$	$\csc 7\pi/6$
$\sec 5\pi/4$	$\cot 4\pi/3$
$\sin 3\pi/2$	$\cos 5\pi/3$
$\tan 7\pi/4$	$\csc 11\pi/6$
$\sec 2\pi$	$\cot 6\pi$

V. Sketch the graph of each of the following functions:

1. $3\sin x$
2. $\sin 2x$
3. $3\sin 2x$
4. $3\sin(x + \pi/4)$
5. $\sin(2x + \pi/4)$
6. $3\sin(2x + \pi/4)$
7. $3\sin(2x + \pi/4) + 8$

VI. Solve for x.

1. $\sin x = \sqrt{3}/2$
2. $\cos x = 2$
3. $3\sin x = \cos x$
4. $3\cos^2 x = 1$

5. $\sin 2x = \sin x$
6. $\sin^2 x + 3\sin x + 1 = 0$
7. $\sin^2 x + \sin x - 1 = 0$
8. $\sin x + \cos x = 1$

VII. Simplify:

1. $3^{\log_3(x^2)}$
2. $10^{-4\log_{10} x}$
3. $\log_a(a^{-x+3})$
4. $\log_2 8 + \log_3 \frac{1}{27}$

VIII. Solve:

1. $\log_5 x = -3$
2. $\log_{10} x + \log_{10}(x+1) = 0$
3. $10^x - 12 + 10^{-x} = 0$

IX. Find all real values of x which satisfy the given equation.

1. $\log_{10}(x+2) = -1$
2. $10^{3x} = 5$
3. $\log_{10}(x^2 + 2x + 1) = 1$
4. $\ln(x^2 + 2x + 10) = 1$
5. $10^{5-x^2} = 100$
6. $10^{1-x^2} = 100$
7. $\log_{10}(x-3) + \log_{10} x = 1$
8. $\log_{10}(x(x-3)) = 1$
9. $2\ln x + \ln(x-1) = 2$
10. $\log_a(x+2) + \log_a x = 2$
11. $\log_a(x(x+2)) = 2$

X. Sketch:

1. e^{-x^2}
2. $\ln|x-1|$
3. xe^{-x}

XI. Evaluate each of the following:

1. $\arctan -1/3$
2. $\arcsin 1/4$
3. $\arcsin(\sin \pi/2)$
4. $\sin(\arctan \sqrt{3})$
5. $\sin(\arcsin \frac{1}{\sqrt{2}})$
6. $\tan(\arcsin 3)$
7. $\arctan(\sin 1/6)$
8. $\arcsin(\sin 3\pi/4)$

XII. Solve:

1. $\sec(\sin x) = -\sqrt{2}$
2. $\cos(\arcsin x) = 1/2$
3. $\sec(\tan x) = -\sqrt{2}$

Answers!

I.

1. $[-1/2, \infty]$
2. $(-\sqrt{2}, \sqrt{2})$
3. $(-\infty, -2) \cup (3, \infty)$
4. $[\frac{1}{5}, 1]$
5. $(-\infty, -3/2) \cup (3/2, \infty)$ $\cup\, (-1/2\sqrt{5}) \cup (1/2\sqrt{5})$
6. $(-\infty, 3)$
7. $(0, 3/5)$
8. $[-3, 3]$
9. $(-5/3, 3)$
10. $[-\frac{1}{2}\sqrt{2}, \frac{1}{2}\sqrt{2}]$
11. $[-11/2, -1/2]$
12. $[-\infty, -3] \cup [3, \infty]$
13. $[-\infty, -1] \cup [1, \infty]$
14. $[-\infty, 1/2) \cup (11/9, \infty)$
15. $(-\infty, -2)$ $\cup(-\frac{4}{5}\sqrt{5}, \frac{4}{5}\sqrt{5}) \cup (2, \infty)$
16. $[-1 - \sqrt{5}, -1 - \sqrt{3}]$ $\cup\, [-1 + \sqrt{3}, \sqrt{5} - 1]$
17. $(-\infty, -11/7) \cup (-1, 3)$
18. $(-\infty, \frac{3}{2} - \frac{1}{2}\sqrt{101})$ $\cup\, (5, \frac{3}{2} + \frac{1}{2}\sqrt{101})$

II.

$\frac{\pi}{6}$	$\frac{5\pi}{3}$
≈ 5.6025	$\frac{\pi}{3}$
$\frac{17\pi}{4}$	$\frac{3\pi}{4}$
$\frac{2\pi}{5}$	≈ 3.7176
$3\pi/2$	$-\pi/2$
$-2\pi/3$	

III.

60	-150
≈ -206.2648	-225
≈ 57.2958	≈ 630.2536
270	1440

IV.

0	$\sqrt{3}/2$
1	$2/\sqrt{3}$
not defined	$-1/\sqrt{3}$
$1/\sqrt{2}$	$-\sqrt{3}/2$
0	-2
$-\sqrt{2}$	$1/\sqrt{3}$
-1	$1/2$
-1	-2
1	not defined

VI.

1. $\pi/3$
2. $x \notin \mathbb{R}$
3. $\arctan \frac{1}{3} + \pi k \quad (k \in \mathbb{Z})$
4. $\pm \arccos \frac{1}{\sqrt{3}} + \pi k \quad (k \in \mathbb{Z})$
5. $\pi k \quad (k \in \mathbb{Z})$
6. $\arcsin\left(\frac{-3+\sqrt{5}}{2}\right) + \pi k \quad (k \in \mathbb{Z})$
7. $\arcsin\left(\frac{-1+\sqrt{5}}{2}\right) + \pi k \quad (k \in \mathbb{Z})$
8. $2\pi k,\ \pi/2 + 2\pi k \quad (k \in \mathbb{Z})$

VII.

1. x^2

2. x^{-4}
3. $-x+3$
4. 0

VIII.

1. $1/125$
2. $\frac{-1+\sqrt{5}}{2}$
3. $\log_{10}(6 \pm \sqrt{35})$

IX.

1. $-19/10$
2. $\log_{10} \sqrt[3]{5}$
3. $-1 \pm \sqrt{10}$
4. $x \notin \mathbb{R}$
5. $\pm\sqrt{3}$
6. $x \notin \mathbb{R}$
7. 5
8. 5
9. ≈ 2.3444
10. $x \notin \mathbb{R}$
11. $x \notin \mathbb{R}$

XI.

1. ≈ 0.3218 radians
2. ≈ 0.2527 radians
3. $\pi/2$
4. $\sqrt{3}/2$
5. $1/\sqrt{2}$
6. not defined
7. ≈ 0.1644 radians
8. $-\pi/2$

XII.

1. $x \notin \mathbb{R}$
2. $\pm\sqrt{3}/2$
3. $\approx$ 1.1694 radians, or $\approx$ 1.3214 radians