Problem 1. Solve for x, given that

$$\ln(x^2) = 2\ln(3).$$

Solution: Notice first that

$$2\ln(3) = \ln(3^2) = \ln(9).$$

Exponentiating both sides gives that

$$x^2 = 9,$$

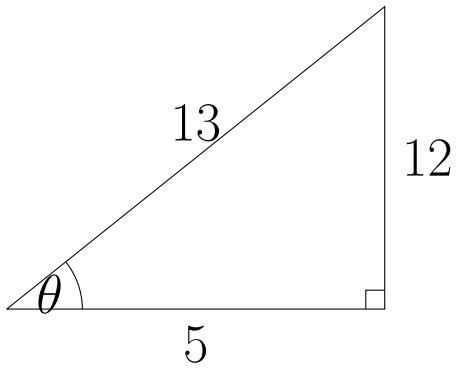
hence $x = \pm 3$.

Problem 2. If $0 \leq \theta \leq \pi/2$ is an angle in the first quadrant, and

$$\sin(\theta) = 12/13,$$

find $\tan(\theta)$.

Solution: Using the Pythagorean Theorem, one has the triangle



Since tangent is opposite over adjacent, $\tan(\theta) = 12/5$.

Problem 3. Compute

$$\lim_{x \to 1} f(x)$$

numerically, given that

$$f(x) = \begin{cases} 2x + 3 & \text{if } x < 1 \\ 5 & \text{if } x = 1 \\ 3x - 3 & \text{if } x > 1. \end{cases}$$

Solution: We fill out a table of inputs and outputs:

x	.9	.99	.999	1	1.001	1.01	1.1
$f(x)$	4.8	4.98	4.998	$-$	0.003	0.03	0.3

From the table, we see that

$$\lim_{x \to 1^-} f(x) = 5$$

and

$$\lim_{x \to 1^+} f(x) = 0.$$

Since the left and right limits disagree,

$$\lim_{x \to 1} f(x) \text{ DNE.}$$