

Pre-Calculus Exercises

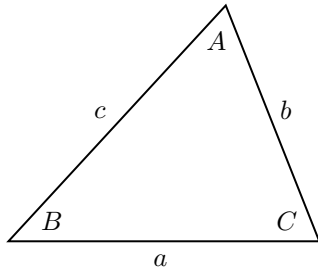
A. Prove the following identities.

1. $\tan(x+y) = \frac{\tan(x)+\tan(y)}{1-\tan(x)\tan(y)}$

2. $\sin(3x) = 3\sin(x) - 4\sin(x)^3$

3. $\cos(x)\cos(y) = \frac{\cos(x-y)+\cos(x+y)}{2}$

B. Refer to the diagram of the triangle. Find the indicated value for each given set of angle and side measurements.



1. $a = 6, B = \pi/2, A = \pi/4, c = ?$

2. $a = 1, b = 1, C = \pi/3, c = ?$

3. $A = \pi/2, b = 3, C = 2\pi/3, a = ?$

4. $C = \pi/2, a = 1, b = 1, c = ?$

5. $a = b = c = 1, A = ?$

C. Draw the following sets on a number line.

1. $(0, 3) \cup (4, 6)$

3. $\{2x : x \in \mathbb{R}\} \cap (0, 10)$

5. $\{x \in \mathbb{R} : x^2 - 4 < 0\}$

2. $[0, 5] \cap (1, 10]$

4. $\{x^2 : x \in \mathbb{R}\} \cup (0, 1)$

6. $\{x \in \mathbb{R} : x^2 > 0\}$

D. For each real-function, state the (largest possible) domain and range. State whether the function is injective, surjective, and/or bijective. Then find a restricted domain and codomain on which the function is invertible, and find its inverse.

1. $f(x) = \sqrt{x}$

4. $f(x) = \frac{1}{x+1}$

7. $f(x) = \tan(x)$

2. $f(x) = x^3$

5. $f(x) = \frac{x}{x^2+x}$

8. $f(x) = \csc(x)$

3. $f(x) = x^4$

6. $f(x) = \cos(x)$

9. $f(x) = \log_2(x)$