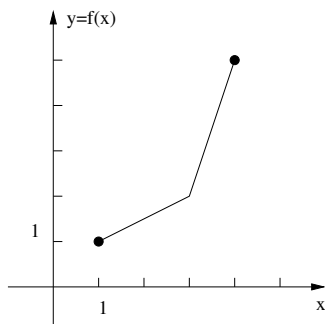


Worksheet # 6: Algebraic Evaluation of Limits, Inverse Functions, and Trigonometric Functions

1. Let $f(x) = \sqrt{x}$
 - (a) Let $g(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ and find $g(x)$.
 - (b) What is the geometric meaning of $g(4)$?
 - (c) What is the domain of $g(x)$?
2. Find the limit or explain why it does not exist. Use the limit rules to justify each step.
 - (a) $\lim_{x \rightarrow 2} \frac{x+2}{x^2-4}$
 - (b) $\lim_{x \rightarrow 2} \frac{x-2}{x^2-4}$
 - (c) $\lim_{x \rightarrow 2} \frac{x-2}{x^2+4}$
 - (d) $\lim_{x \rightarrow 2} \left(\frac{1}{x-2} - \frac{3}{x^2-x-2} \right)$.
3. Consider the function $f(x) = 1 + \ln(x)$. Determine the inverse function of f .
4. Consider the function whose graph appears below.



- (a) Find $f(3)$, $f^{-1}(2)$ and $(f(2))^{-1}$.
 - (b) Give the domain and range of f and of f^{-1} .
 - (c) Sketch the graph of f^{-1} .
5. Convert the angle $\pi/12$ to degrees and the angle 900° to radians. Give exact answers.
6. Find the exact values of the following expressions. Do not use a calculator.
 - (a) $\tan^{-1}(1)$
 - (b) $\tan(\tan^{-1}(10))$
 - (c) $\sin^{-1}(\sin(7\pi/3))$
 - (d) $\tan(\sin^{-1}(0.8))$
7. Let O be the center of a circle whose circumference is 48 centimeters. Let P and Q be two points on the circle that are endpoints of an arc that is 6 centimeters long. Find the angle between the segments OQ and OP . Express your answer in radians.
Find the distance between P and Q .

8. If $\pi/2 \leq \theta \leq 3\pi/2$ and $\tan \theta = 4/3$, find $\sin \theta$, $\cos \theta$, $\cot \theta$, $\sec \theta$, and $\csc \theta$.
9. Find all solutions to the following equations in the interval $[0, 2\pi]$. You will need to use some trigonometric identities.
- (a) $\sqrt{3} \cos(x) + 2 \tan(x) \cos^2(x) = 0$
 - (b) $3 \cot^2(x) = 1$
 - (c) $2 \cos(x) + \sin(2x) = 0$
10. True or False:
- (a) Let $p(x) = c_n x^n + c_{n-1} x^{n-1} + \dots + c_1 x + c_0$ be a polynomial with coefficients c_n, c_{n-1}, \dots, c_0 . Then $\lim_{x \rightarrow a} p(x) = c_n a^n + c_{n-1} a^{n-1} + \dots + c_1 a + c_0$.
 - (b) If $\lim_{x \rightarrow 0} (f(x))^2$ exists, then $\lim_{x \rightarrow 0} f(x)$ exists.
 - (c) Every function has an inverse.
 - (d) The graph of every function will pass the horizontal line test.