

Show your work for full credits.

1. Prove

$$\lim_{x \rightarrow 3} 3x - 3 = 6$$

2. Prove

$$\lim_{x \rightarrow -2} x^2 - 3x = 10$$

3. An object has the initial speed of 100 m/s. Find an angle of elevation that can be used to hit a target 800 m away. Express the angle to the nearest degree measure. (Use $g = -10 \text{ m/s}^2$)

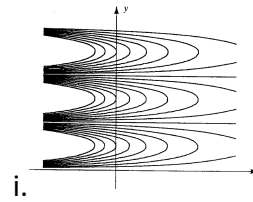
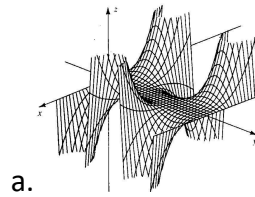
4. Find and sketch the domain of the function.

a. $f(x, y) = \sqrt{xy}$

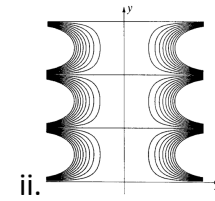
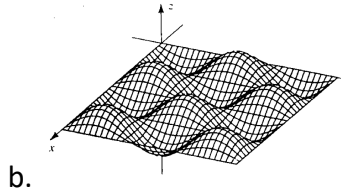
b. $f(x, y) = \arcsin(x^2 + y^2 - 1)$

5. Match

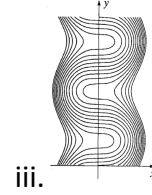
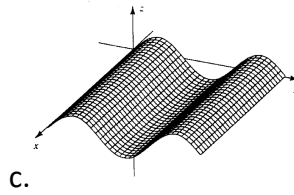
1. $z = -\frac{1}{9}x^3 \sin y$



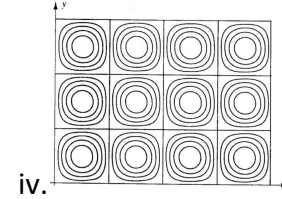
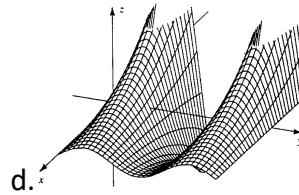
2. $z = \sin y$



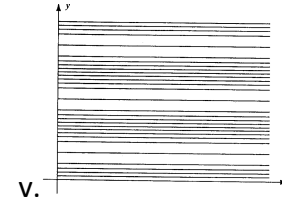
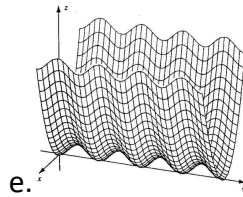
3. $z = 3e^{-x/5}$



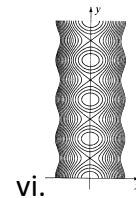
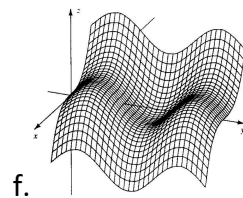
4. $z = -\sin x \sin y$



5. $z = \frac{1}{2}x^2 + \sin^2 y$



6. $z = \sin y - \frac{1}{9}x^3$



6. A medieval city has the shape of a square and is protected by walls with length 500 m and height 15 m. Cap is the commander of an attacking army and the closest he can get to the wall is 100 m. His plan is to set fire to the city by catapulting heated rocks over the wall (with an initial speed of 80 m/s). Deb is the major of the city. Knowing the speed of the rock and how far the attacking army is at, she plans to raise the wall. How high should she raise the wall to prevent the rocks to come in to the city? Express the height of the new wall to the nearest meter.