



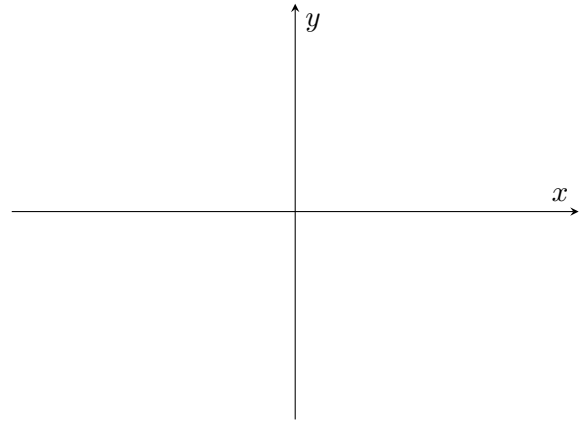
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## MATH 100

### Assignment 1

1. (2 marks) Sketch the graphs of both  $y = \sqrt{1 - x^2}$  and  $y = \sqrt{x}$  and find the coordinates of the point(s) where the curves intersect each other. Round your answer to three decimal places.



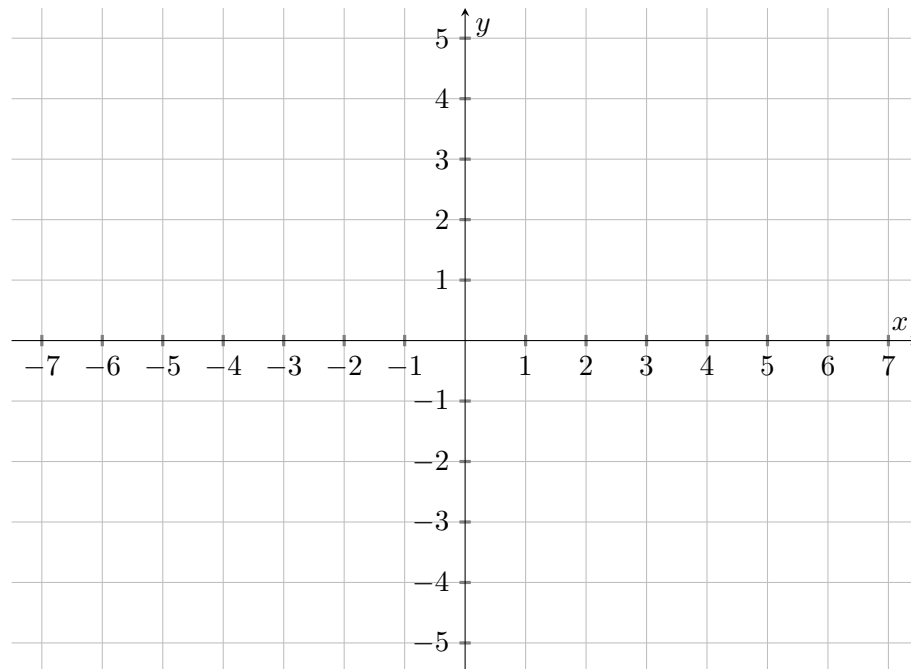
2. (2 marks) Find the equation of the line that passes through the point  $(2, -\frac{2}{3})$  and is perpendicular to the line  $7x + 3y = -5$ . Express your answer in the slope-intercept form  $y = mx + b$ .

3. (2 marks) Does the following equation define  $y$  as a function of  $x$ ? Explain.

$$x^2(y - 2) = 3x - 4y + 8$$

4. (2 marks) Sketch the graph of the piecewise-defined function

$$f(x) = \begin{cases} 3, & -4 < x < -2 \\ 4 - x^2, & -2 \leq x < 1 \\ |x - 2|, & 1 \leq x \leq 4. \end{cases}$$



5. (2 marks) Solve the equation for  $\theta$ , where  $0 \leq \theta < 2\pi$ .

$$\tan^2 \theta + \sec \theta = 1$$

6. (2 marks) Use the  $\epsilon$ - $\delta$  definition of a limit to prove  $\lim_{x \rightarrow 3} (4x - 5) = 7$ .

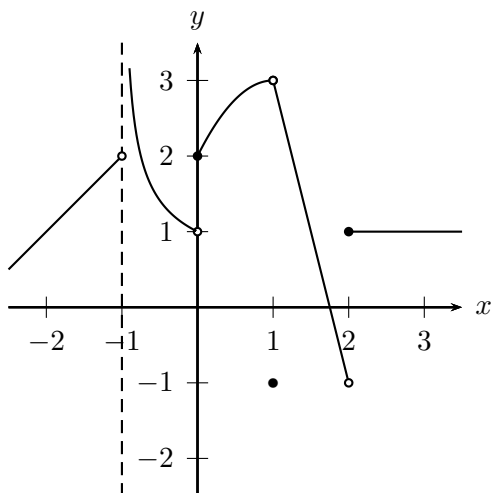
7. Evaluate the limits.

(a) (2 marks)  $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{2x^3 - 7x - 2}$

(b) (2 marks)  $\lim_{x \rightarrow 5} \frac{\sqrt{8x + 9} - 7}{x - 5}$

(c) (2 marks)  $\lim_{\theta \rightarrow 0} 3\theta \cot 4\theta$

8. (2 marks) Evaluate the following for the function  $f$  whose graph is given below.



(i)  $\lim_{x \rightarrow -1^-} f(x) = \underline{\hspace{2cm}}$

(ii)  $\lim_{x \rightarrow -1^+} f(x) = \underline{\hspace{2cm}}$

(iii)  $\lim_{x \rightarrow 1} f(x) = \underline{\hspace{2cm}}$

(iv)  $f(f(0)) = \underline{\hspace{2cm}}$

9. (2 marks) Consider the function

$$f(x) = \begin{cases} \frac{1 - \cos x}{x}, & x < 0 \\ 1, & x = 0 \\ \frac{x}{\sqrt{x}}, & x > 0. \end{cases}$$

- (a) Evaluate  $\lim_{x \rightarrow 0} f(x)$ , or if it does not exist, then explain why.

- (b) Is  $f$  continuous at  $x = 0$ ? If not, is  $x = 0$  a removable discontinuity? Explain.

10. (3 marks) Let  $f(x) = \frac{2x^2 + 5x - 15}{x - 3}$  on the interval  $[-2, 0]$  and let  $k = 4$ .

(a) Verify that the conditions of the Intermediate Value Theorem are satisfied, guaranteeing the existence of some number  $c$  in the given interval for which  $f(c) = k$ .

(b) Find the value(s) of  $c$  from part (a).