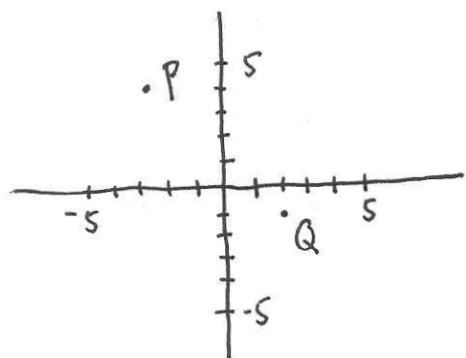


Exam I-C

1.



$$d(P, Q) = \sqrt{(-3-2)^2 + (4-(-1))^2} = \sqrt{50}$$

$$m = \left(\frac{-3+2}{2}, \frac{4+(-1)}{2} \right) = \left(-\frac{1}{2}, \frac{3}{2} \right)$$

2.

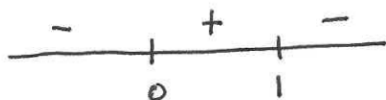
$$a) \quad |4 + 3y| = 1 \quad \left\{ -\frac{5}{3}, -1 \right\}$$

$$\begin{aligned} 4 + 3y &= 1 & 3y &= -3 & y &= -1 \\ \text{or} & & & & & \\ -(4 + 3y) &= 1 & -4 - 3y &= 1 & -3y &= 5 & y &= -\frac{5}{3} \end{aligned}$$

b)

$$x - x^2 > 0$$

$$x(1-x) > 0$$



$$\{ (0, 1) \}$$

3.

$$x^2 + 2x + \underline{1} + y^2 - 10y + \underline{25} = 2 + 1 + 25$$

$$(x+1)^2 + (y-5)^2 = 28 \quad C = (-1, 5), \quad r = \sqrt{28}$$

4.

$$3y = -4x + 6$$

$$y = -\frac{4}{3}x + 2$$

$$y - (-3) = -\frac{4}{3}(x - 2)$$

5.

$$a) \quad x - 1 \geq 0 \quad x \geq 1$$

$$D = [1, \infty)$$

and

$$x \neq 0$$

b)

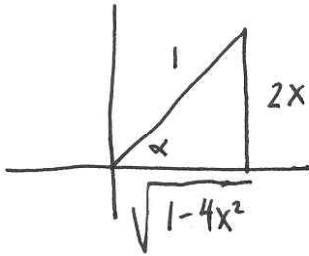
$$f(-2) \text{ DNE}$$

$$f(1) = 0$$

$$f(2) = \frac{1}{2}$$

$$6. \quad \tan(\sin^{-1} 2x) = \tan \alpha = \frac{2x}{\sqrt{1-4x^2}}$$

$$\sin \alpha = 2x$$



$$7. \quad \log_3 x(x-8) = 2$$

$$x(x-8) = 3^2 = 9$$

$$x = 9 \text{ or } x = -1$$

extraneous

$$x^2 - 8x - 9 = 0$$

$$(x-9)(x+1) = 0$$

{ 9 }

$$9. \quad a) \quad \lim_{x \rightarrow 1} \frac{x^2 + 3x - 2}{x^2 - 2x + 2} = \frac{1^2 + 3(1) - 2}{1^2 - 2(1) + 2} = \frac{2}{1} = 2$$

$$b) \quad \lim_{x \rightarrow 3} \frac{x^2 - 5x + 6}{x^2 - 3x} = \lim_{x \rightarrow 3} \frac{(x-2)(x-3)}{x(x-3)} = \frac{1}{3}$$

$$c) \quad \lim_{x \rightarrow 0} \frac{4x}{\sin 2x \cos x} = \lim_{x \rightarrow 0} \frac{2x}{\sin 2x} \cdot \frac{2}{1} \cdot \frac{1}{\cos x} = 2 \cdot 1 = 2$$

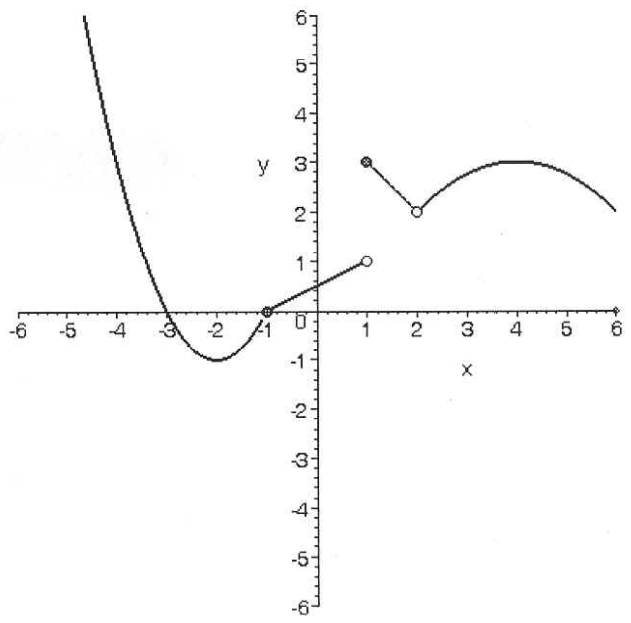
$$10. \quad \lim_{x \rightarrow 1^-} f(x) = \lim_{x \rightarrow 1^-} 2x - a = 2 - a$$

$$\lim_{x \rightarrow 1^+} f(x) = \lim_{x \rightarrow 1^+} ax^2 + 1 = a + 1$$

$$2 - a = a + 1 \Rightarrow a = \frac{1}{2}$$

Exam 1-2

8. (15 pts) Consider the function f defined by the graph to the right. Find each of the following (if they exist). If they do not exist, state so. Also determine if the function is continuous at the given point. If it is not continuous at the given point, state so.



- | | | |
|--|---|---|
| A1. $f(-1) = 0$ | A2. $f(1) = 3$ | A3. $f(2)$ DNE |
| B1. $\lim_{x \rightarrow -1^-} f(x) = 0$ | B2. $\lim_{x \rightarrow 1^-} f(x) = 1$ | B3. $\lim_{x \rightarrow 2^-} f(x) = 2$ |
| C1. $\lim_{x \rightarrow -1^+} f(x) = 0$ | C2. $\lim_{x \rightarrow 1^+} f(x) = 3$ | C3. $\lim_{x \rightarrow 2^+} f(x) = 2$ |
| D1. $\lim_{x \rightarrow -1} f(x) = 0$ | D2. $\lim_{x \rightarrow 1} f(x)$ DNE | D3. $\lim_{x \rightarrow 2} f(x) = 2$ |
| E1. Is f continuous at -1? Yes | E2. Is f continuous at 1? No | E3. Is f continuous at 2? No |

9. (24 pts) Algebraically evaluate each of the following limits.

- A. $\lim_{x \rightarrow 1} \frac{x^2 + 3x - 2}{x^2 - 2x + 2}$
- B. $\lim_{x \rightarrow 3} \frac{x^2 - 5x + 6}{x^2 - 3x}$
- C. $\lim_{x \rightarrow 0} \frac{4x}{\sin 2x \cos x}$

10. (8 pts) Find the constant a so that $f(x) = \begin{cases} 2x - a & x < 1 \\ ax^2 + 1 & x \geq 1 \end{cases}$ will be continuous at $x = 1$.