HW

30. For all x and y such that $xy \neq 0$, let $f(x,y) = \dfrac{xy}{x^2+y^2}$. Then $f(x,-x) =$

$$\frac{x(-x)}{x^2+(-x)^2} = \frac{-x^2}{2x^2} = -\frac{1}{2}$$

(A) $-x^2$

(B) $-\dfrac{1}{x^2}$

(C) $-\dfrac{1}{2}$

(D) 0

(E) $\dfrac{1}{2}$

6. For all $y \neq 5$, $\dfrac{y^3 - 6y^2 + 3y + 10}{y^2 - 10y + 25} =$

(A) $\dfrac{y^2 - y + 2}{y + 5}$

(B) $\dfrac{y^2 - y - 2}{y - 5}$

(C) $\dfrac{y^2 + y - 2}{y + 5}$

(D) $\dfrac{y^2 + y - 2}{y - 5}$

(E) $\dfrac{y^2 - y + 2}{y - 5}$

$\hookrightarrow (y-5)^2$

$$\begin{array}{r|cccc} 5 & 1 & -6 & 3 & 10 \\ & & 5 & -5 & -10 \\ \hline & 1 & -1 & -2 & 0 \end{array}$$

$\hookrightarrow y^2 - y - 2$

4. If $\frac{x+2y}{y}=5$, what is the value of $\frac{y}{x}$?

(A) -3 (B) $-\frac{1}{3}$ (C) $\frac{1}{3}$ (D) 3 (E) 4

$\frac{x}{y}+2=5 \rightarrow \frac{x}{y}=3 \quad \frac{y}{x}=\frac{1}{3}$

33. An insurance company has found that the proportion of claims that are resolved within t days is given by $p(t) = \left(\frac{t}{t+10}\right)^2$. How many days does it take to resolve 75 percent of the claims?

(A) 1 (B) 13 (C) 30 (D) 65 (E) 75

$$\frac{3}{4} = \left(\frac{t}{t+10}\right)^2 \qquad \frac{4}{3} = \left(\frac{t+10}{t}\right)^2$$

$$\frac{4}{3} = \left(1+\frac{10}{t}\right)^2$$

$$\frac{2}{\sqrt{3}} = 1+\frac{10}{t}$$

$$\frac{2}{\sqrt{3}} - 1 = \frac{10}{t}$$

50. A function f has the property that $f\left(\frac{x}{2}\right) = \sqrt{\frac{1+f(x)}{2}}$ for $0 \le x \le 1$. If $f(a) = 0$, where $0 \le a \le 1$, what is the value of $f\left(\frac{a}{4}\right)$?

(A) 0
(B) 0.35
(C) 0.71
(D) 0.92
(E) 0.98

$$f\left(\frac{a}{2}\right) = \sqrt{\frac{1+f(a)}{2}} = \frac{1}{\sqrt{2}}$$

$$f\left(\frac{a}{4}\right) = \sqrt{\frac{1+f\left(\frac{a}{2}\right)}{2}} = \sqrt{\frac{1+\frac{1}{\sqrt{2}}}{2}}$$

50. Which of the following describes the values of x for which $\frac{1-5x}{x^2+1}$ is negative?

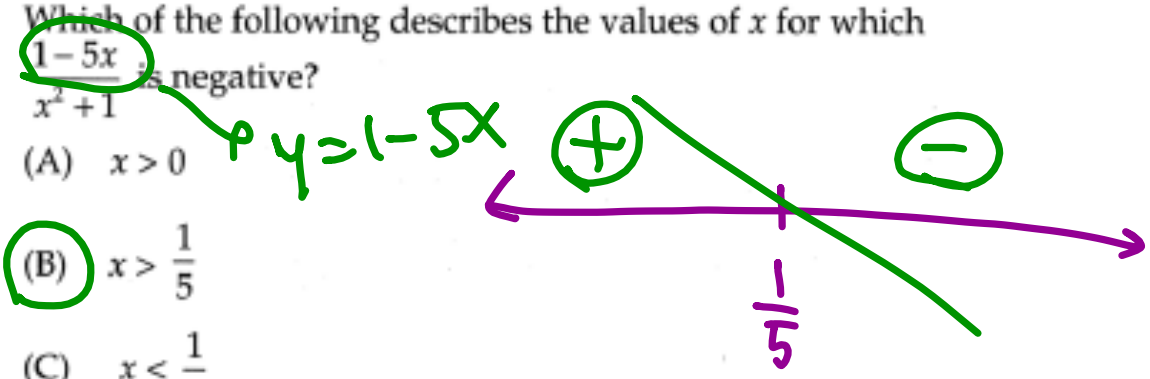
(A) $x > 0$

(B) $x > \frac{1}{5}$

(C) $x < \frac{1}{5}$

(D) $0 < x < \frac{1}{5}$

(E) None of the above



32. Which of the following are the equations of lines that are asymptotes of the graph of $y = \dfrac{x^2 - 64}{(3x+4)(x-5)}$?

I. $x = -8$

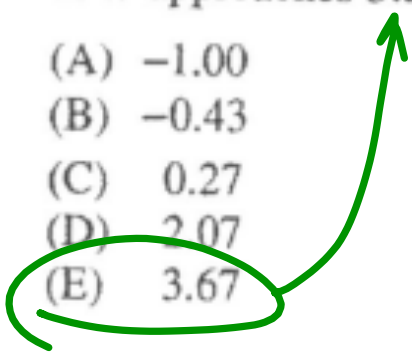
II. $x = 5$

III. $y = \dfrac{1}{3}$

(A) I only
(B) II only
(C) I and II only
(D) II and III only
(E) I, II, and III

19. If $f(x) = \dfrac{x+2}{x-2}$, what value does $f(x)$ approach as x approaches 3.5 ?

(A) −1.00
(B) −0.43
(C) 0.27
(D) 2.07
(E) 3.67



Exercise 10 The solutions of the equation $x^2 + px + q = 0$ are the cubes of the solutions of the equation $x^2 + mx + n = 0$. Which of the following must be true?

(A) $p = m^3 + 3mn$ **(B)** $p = m^3 - 3mn$ **(C)** $p = 3mn - m^3$

(D) $p + q = m^3$ **(E)** $\left(\frac{m}{n}\right)^3 = \frac{p}{q}$

a^3 b^3

a b

$a+b=-m$ | $a^3+b^3=-p$

$ab=n$ | $a^3b^3=q=n^3$

$a^3+b^3=(a+b)(a^2-ab+b^2)$

$=(a+b)(a^2+2ab+b^2-3ab)$

$=(a+b)((a+b)^2-3ab)$

$+P=+m((-m)^2-3n)$

$P=m(m^2-3n)$