

Math 113

Group Quiz 16 Solutions

① a) $\frac{P(x)}{D(x)} = \frac{x^3 + 6x + 5}{x - 4} = \boxed{x^2 + 4x + 22 + \frac{93}{x-4}}$

[10 answer]

$$\begin{array}{r}
 x^2 + 4x + 22 + \frac{93}{x-4} \\
 x-4 \overline{) x^3 + 0x^2 + 6x + 5} \\
 \underline{x^3 - 4x^2} \\
 4x^2 + 6x \\
 \underline{4x^2 - 16x} \\
 22x + 5 \\
 \underline{22x - 88} \\
 93
 \end{array}$$

[5 setup]

b) $\frac{P(x)}{D(x)} = \frac{4x^2 - 3x - 7}{2x - 1} = \boxed{2x - \frac{1}{2} - \frac{15}{2(2x-1)}}$ [10]

or

$$= \boxed{2x - \frac{1}{2} - \frac{15}{2(2x-1)}}$$

$$\begin{array}{r}
 2x - \frac{1}{2} \\
 2x - 1 \overline{) 4x^2 - 3x - 7} \\
 \underline{4x^2 - 2x} \\
 -1x - 7 \\
 \underline{-1x + \frac{1}{2}} \\
 -7.5 - \frac{15}{2}
 \end{array}$$

[5]

① c) $\frac{P(x)}{D(x)} = \frac{6x^3 + x^2 - 12x + 5}{3x - 4} = 2x^2 + 3x + \frac{5}{3x - 4}$ [10]

$$\begin{array}{r}
 2x^2 + 3x + \frac{5}{3x - 4} \\
 3x - 4 \overline{) 6x^3 + x^2 - 12x + 5} \\
 \underline{6x^3 - 8x^2} \\
 9x^2 - 12x \\
 \underline{9x^2 - 12x} \\
 0 + 5
 \end{array}$$

[5]

d) $\frac{P(x)}{D(x)} = \frac{2x^4 - x^3 + 9x^2}{x^2 + 4} = 2x^2 - x + 1 + \frac{4x - 4}{x^2 + 4}$ [10]

$$\begin{array}{r}
 2x^2 - x + 1 + \frac{4x - 4}{x^2 + 4} \\
 x^2 + 0x + 4 \overline{) 2x^4 - x^3 + 9x^2 + 0x + 0} \\
 \underline{2x^4 + 0x^3 + 8x^2} \\
 -x^3 + x^2 + 0x \\
 \underline{-x^3 + 0x^2 - 4x} \\
 x^2 + 4x + 0 \\
 \underline{x^2 + 0x + 4} \\
 4x - 4
 \end{array}$$

[5]

② a) $r(x) = \frac{-2}{x-3}$

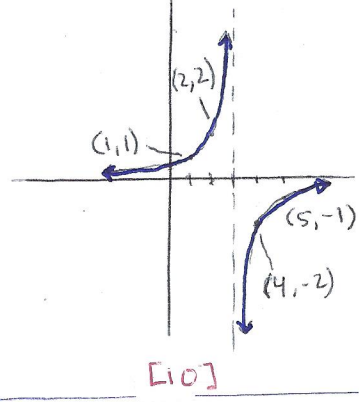
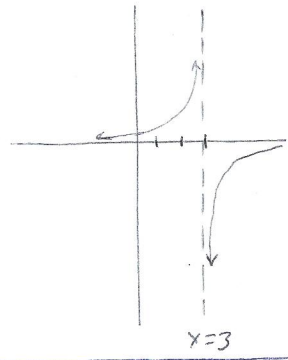
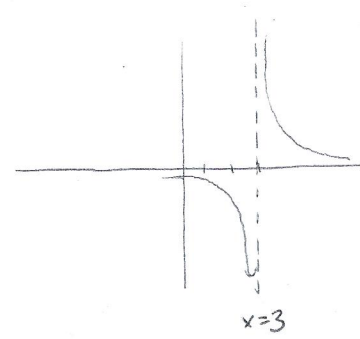
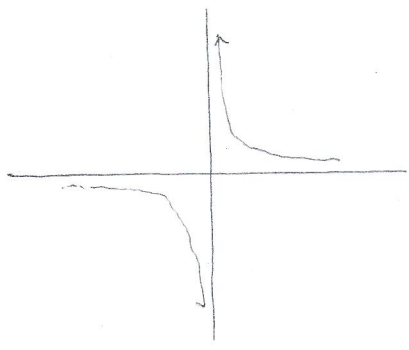
[5 for steps]

let $f(x) = \frac{1}{x} \rightarrow f_1 = f(x-3) = \frac{1}{x-3} \rightarrow f_2 = -f_1 = \frac{-1}{x-3} \rightarrow f_3 = 2f_2 = \frac{-2}{x-3}$

shift right 3 units ✓

reflect across x-axis ✓

vertical stretch by factor of 2 ✓



[10]

b) $r(x) = \frac{3x-3}{x+2} = 3 + \frac{3}{x+2}$

$f_1 = \frac{1}{x}$

[2] for steps

long division:

$$\begin{array}{r} x-2 \overline{) 3x-3} \\ \underline{3x-6} \\ 3 \end{array}$$

[3] for long division

$f_2 = \frac{1}{x-2}$

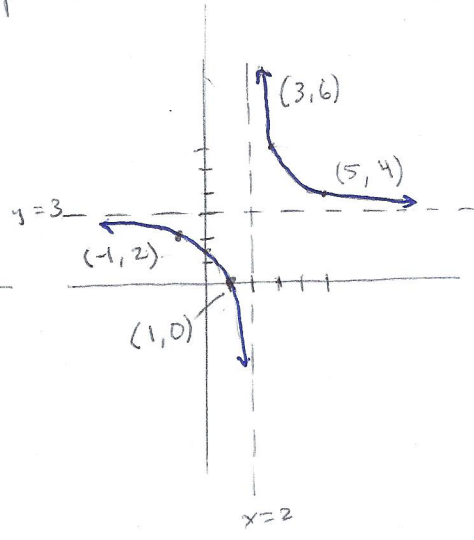
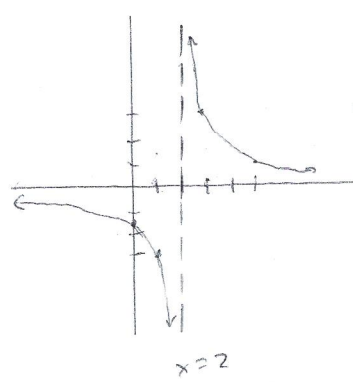
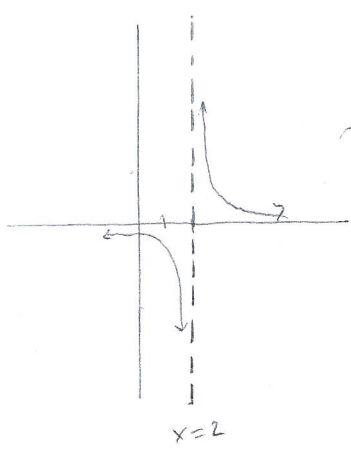
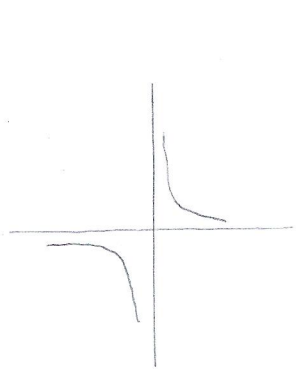
shift right 2 units

$f_3 = \frac{3}{x-2}$

vertical stretch by factor of 3.

$f_4 = 3 + \frac{3}{x-2}$

shift up 3 units.



[10]

2) c)

$$r(x) = \frac{2x-9}{x-4} = 2 - \frac{1}{x-4}$$

$$\begin{array}{r}
 x-4 \overline{) 2x-9} \\
 \underline{2x-8} \\
 -1
 \end{array}$$

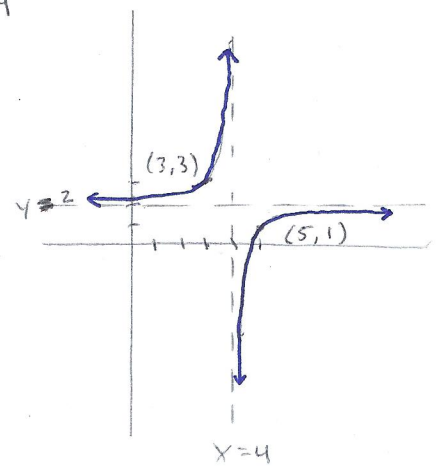
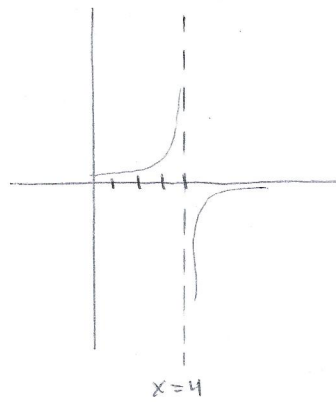
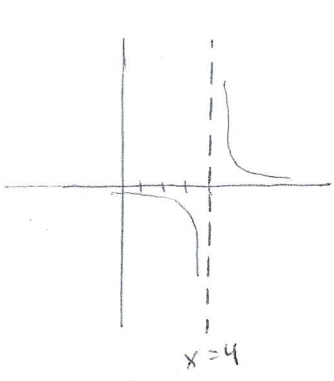
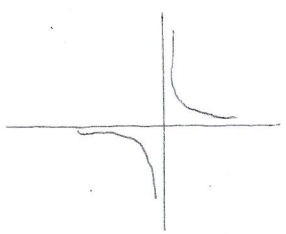
[3] for long division

$f_1 = \frac{1}{x}$

$f_2 = \frac{1}{x-4}$ right 4 units [2] for steps

$f_3 = -\frac{1}{x-4}$ reflect across x-axis

$f_4 = 2 - \frac{1}{x-4}$ up 2 units



[5]