Practice Math 120

This is for practice only!

1. Find the quotient by long division and synthetic division:

$$\frac{3x^4 + 9x^3 - 5x - 1}{x + 2}$$

(a) Long Division

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  3x^3 + 3x^2 - 6x + 7 + \frac{1}{x + 2}

  \underline{3x^3 + 6x^2 - 6x - 12x}
  \underline{3x^3 + 0x^2 - 6x - 1}
  \underline{-x - 1}
  \underline{-x + 14}
  \underline{\frac{9x - 7}{15}}
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(b) Synthetic Division

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\begin{array}{c|ccccc}
1 & 3 & 9 & 0 & -5 & -1 \\
\hline
& 3 & 3 & 6 & 12 & 15 \\
\end{array}
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Same answer (11)

2. Perform the operation and reduce the result:

(a) \( \frac{3b^3(b-5)}{7b^3-35b} \) = \( \frac{49b^2 \cdot \frac{1}{b(b-5)}}{7b^3 \cdot \frac{1}{b(b-5)}} \) = \( \frac{49b^2 \cdot b(b+5)}{7b^3 \cdot b^2} \)

(b) \( \frac{x^2 - 6x - 55}{x^2 + 10x + 25} \) = \( \frac{x - 11}{x + 5} \) \( \cdot \frac{x + 5}{x + 5} \) \( x + 11 \) \( \cdot \frac{x + 11}{x + 3} \) \( \cdot \frac{x - 5}{x + 2} \)

LCD = 24y

= \( \frac{3 + 58y}{24y} \)

3. Find the slope of the line that passes through the points \( \left( -3, \frac{2}{3} \right) \) and \( \left( \frac{5}{2}, \frac{1}{6} \right) \).

\( m = \frac{\frac{5}{2} - \frac{2}{3}}{\frac{5}{2} + \frac{2}{3}} \cdot \frac{30}{30} \) = \( \frac{5 \cdot 20}{75 + 18} \) \( = \frac{100}{93} \) \( = \frac{\frac{5}{93}}{31} \)

4. Simplify the complex fraction:

\( \frac{25s^2 - 49l^2}{5} \cdot \frac{5}{7} \cdot \frac{l}{s} \cdot \frac{5s - 7l}{5s - 7l} = \frac{25s^2 - 49l^2}{5s - 7l} = \frac{(5s - 7l)(5s + 7l)}{5s - 7l} = \frac{5s + 7l}{1} \)

5. For full credit, you must clearly define variables, set up an equation in one variable that involves ratios and solve the equation. (Leave solutions in reduced fraction form.)

(a) One person wax a typical car in 4 hours. A second person can do the same labor in 6 hours time. How long will it take to wax a typical car if they work together?

\( \frac{1}{4} + \frac{1}{6} = \frac{1}{t} \) \( \Rightarrow 24t \left( \frac{1}{4} + \frac{1}{6} \right) = \frac{t}{6} \) \( \Rightarrow 24t \)

(b) On a local map, 3 inches is equivalent to 11 miles. How many miles would be represented by 8 inches on the same map?

\( \frac{3\text{ in}}{11\text{ mi}} \cdot \frac{8\text{ in}}{x} \) = \( \frac{88}{29} \) or 29 \( \frac{11}{2} \) miles

\( \frac{2 \frac{3}{10}}{2} \text{ hr} \)
6. List any undefined values for x for the equation and then solve the equation.

\[ \frac{2}{x+4} - \frac{4}{x-5} = \frac{-18}{(x+4)(x-5)} \]

\[ \text{LCD} = (x+4)(x-5) \]

a) \[ \frac{2}{x+4} - \frac{4}{x-5} = -18 \]

\[ \text{Undefined: } x \neq 5, 4 \]

\[ \text{Ans: } x = \frac{-5}{4} \]

b) \[ (1 + \frac{6}{y+2}) = \frac{4}{y-2} \]

\[ \text{LCD} = (y+2)(y-2) \]

\[ (y+6)(y-2) = 4(y+y^2) \]

\[ y^2 + 4y + 6y - 12 = 4y + 8 \]

\[ y^2 + 12y - 8 = 0 \]

\[ y = -6, 4 \]

\[ y = -6 \text{ is not in domain} \]

\[ y = 4 \]

\[ x = -4 \text{ is not in domain} \]

7. Determine whether the problem involves an equation or an expression. If it involves an equation, solve that equation. If it involves an expression, perform the operation and reduce the result.

\[ \text{L.C.D.} = x(x-1) \]

a) \[ \frac{2 + 9}{r - r^{-2}} = \frac{2(r-2) + 9r}{r(r-2)} \]

\[ \frac{2r - 4 + 9r}{L.C.D.} = \frac{11r - 4}{r(r-2)} \]

b) \[ \frac{2}{x-1} \cdot \frac{3}{x} = (0) \cdot \frac{x}{x-1} \]

\[ \frac{2x - 3(x-1)}{0} = 0 \]

\[ x = 3 \]

8. Given the following functions, answer/evaluate each question. Reduce all expressions.

\[ f(x) = \frac{1}{x} \quad g(x) = \frac{3x}{x^2 - 5x} \quad r(x) = \frac{4}{x^2 - 25} \]

\[ \text{a) Domain of } g(x) = \mathbb{R} - \{0, 5, 5 \} \]

\[ \{ -\infty, 0 \} \cup (0, \infty) \]

\[ \text{b) } f(4) = \frac{1}{4} \]

\[ \text{c) } g(x) - r(x) = \frac{3x}{x(x-5)} - \frac{4}{(x+5)(x-5)} \]

\[ \text{L.C.D.} = (x+5)(x-5) \]

\[ \text{d) } f(4+h) = \frac{1}{4+h} \]

\[ \frac{1}{4+h} - \frac{1}{4} = \frac{1}{4} \frac{-1}{(4+h)} \]

\[ \frac{4}{4(4+h)} \]

\[ \frac{h}{4(4+h)} \]

\[ \frac{4(4+h) - 1}{4} \]

\[ \frac{4h}{4h(4+h)} = \frac{-1}{4(4+h)} \]

\[ \frac{4}{3(y+15)} \]

\[ \text{L.C.D.} = (y+5)(y-5) \]

\[ \frac{2y + 11}{(y+5)(y-5)} \]

9. Graph each function using the methods taught in class. (one square = one unit)

a) \[ f(x) = -(x+1)^2 \]

b) \[ g(x) = |x| - 2 \]

c) \[ p(x) = (x-3)^3 \]

d) \[ r(x) = \frac{1}{x+4} \]