

PROBLEMS ON PRE-CALCULUS ALGEBRA MTH112

CHAPTER REVIEW

Exercise 1.

Let $A = \{x \in \mathbb{N} | x : 5\}$ and $B = \{x \in \mathbb{N} | x : 3\}$. Determine

- a) $A \cap B$ b) $A \cup B$ c) $A \cup (A \cap B)$

Exercise 2. Let $A = [-2; 4]$, $B = (1; 5)$, $C = [-3; 3]$ be three sets of the universal set $X = [-5; 5]$

Determine

- a) $A \cup B$ b) $A \cap (B \cup C)$ d) \bar{A}
 e) $\bar{A} \cap (B \cup \bar{C})$ f) $\overline{A \cap B}$ g) $A \cup \overline{(B \cap C)}$

Exercise 4.

In Problems 9–20, use $U = \text{universal set} = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 3, 4, 5, 9\}$, $B = \{2, 4, 6, 7, 8\}$, and $C = \{1, 3, 4, 6\}$ to find each set.

- | | | | |
|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| 9. $A \cup B$ | 10. $A \cup C$ | 11. $A \cap B$ | 12. $A \cap C$ |
| 13. $(A \cup B) \cap C$ | 14. $(A \cap B) \cup C$ | 15. \bar{A} | 16. \bar{C} |
| 17. $\overline{A \cap B}$ | 18. $\overline{B \cup C}$ | 19. $\bar{A} \cup \bar{B}$ | 20. $\overline{B \cap C}$ |

Exercise 5.

In Problems 65–68, determine the domain of the variable x in each expression.

$$\begin{array}{ll} \textbf{65. } \frac{4}{x-5} & \textbf{66. } \frac{-6}{x+4} \\ \textbf{67. } \frac{x}{x+4} & \textbf{68. } \frac{x-2}{x-6} \end{array}$$

≤

Exercise 6.

In Problems 89–104, find the quotient and the remainder. Check your work by verifying that

$$(\text{Quotient})(\text{Divisor}) + \text{Remainder} = \text{Dividend}$$

- | | |
|--|---|
| 89. $4x^3 - 3x^2 + x + 1$ divided by $x + 2$ | 90. $3x^3 - x^2 + x - 2$ divided by $x + 2$ |
| 91. $4x^3 - 3x^2 + x + 1$ divided by x^2 | 92. $3x^3 - x^2 + x - 2$ divided by x^2 |
| 93. $5x^4 - 3x^2 + x + 1$ divided by $x^2 + 2$ | 94. $5x^4 - x^2 + x - 2$ divided by $x^2 + 2$ |
| 95. $4x^5 - 3x^2 + x + 1$ divided by $2x^3 - 1$ | 96. $3x^5 - x^2 + x - 2$ divided by $3x^3 - 1$ |
| 97. $2x^4 - 3x^3 + x + 1$ divided by $2x^2 + x + 1$ | 98. $3x^4 - x^3 + x - 2$ divided by $3x^2 + x + 1$ |
| 99. $-4x^3 + x^2 - 4$ divided by $x - 1$ | 100. $-3x^4 - 2x - 1$ divided by $x - 1$ |
| 101. $1 - x^2 + x^4$ divided by $x^2 + x + 1$ | 102. $1 - x^2 + x^4$ divided by $x^2 - x + 1$ |
| 103. $x^3 - a^3$ divided by $x - a$ | 104. $x^5 - a^5$ divided by $x - a$ |

Exercise 7.

In Problems 75–122, factor completely each polynomial. If the polynomial cannot be factored, say it is prime.

75. $x^2 - 36$

76. $x^2 - 9$

77. $2 - 8x^2$

78. $3 - 27x^2$

79. $x^2 + 11x + 10$

80. $x^2 + 5x + 4$

81. $x^2 - 10x + 21$

82. $x^2 - 6x + 8$

83. $4x^2 - 8x + 32$

84. $3x^2 - 12x + 15$

85. $x^2 + 4x + 16$

86. $x^2 + 12x + 36$

87. $15 + 2x - x^2$

88. $14 + 6x - x^2$

89. $3x^2 - 12x - 36$

90. $x^3 + 8x^2 - 20x$

91. $y^4 + 11y^3 + 30y^2$

92. $3y^3 - 18y^2 - 48y$

93. $4x^2 + 12x + 9$

94. $9x^2 - 12x + 4$

95. $6x^2 + 8x + 2$

96. $8x^2 + 6x - 2$

97. $x^4 - 81$

98. $x^4 - 1$

99. $x^6 - 2x^3 + 1$

100. $x^6 + 2x^3 + 1$

101. $x^7 - x^5$

102. $x^8 - x^5$

103. $16x^2 + 24x + 9$

104. $9x^2 - 24x + 16$

105. $5 + 16x - 16x^2$

106. $5 + 11x - 16x^2$

107. $4y^2 - 16y + 15$

108. $9y^2 + 9y - 4$

109. $1 - 8x^2 - 9x^4$

110. $4 - 14x^2 - 8x^4$

111. $x(x + 3) - 6(x + 3)$

112. $5(3x - 7) + x(3x - 7)$

113. $(x + 2)^2 - 5(x + 2)$

114. $(x - 1)^2 - 2(x - 1)$

115. $(3x - 2)^3 - 27$

116. $(5x + 1)^3 - 1$

117. $3(x^2 + 10x + 25) - 4(x + 5)$

118. $7(x^2 - 6x + 9) + 5(x - 3)$

119. $x^3 + 2x^2 - x - 2$

120. $x^3 - 3x^2 - x + 3$

121. $x^4 - x^3 + x - 1$

122. $x^4 + x^3 + x + 1$

Exercise 8.

 In Problems 123–132, expressions that occur in calculus are given. Factor completely each expression.

123. $2(3x + 4)^2 + (2x + 3) \cdot 2(3x + 4) \cdot 3$

124. $5(2x + 1)^2 + (5x - 6) \cdot 2(2x + 1) \cdot 2$

125. $2x(2x + 5) + x^2 \cdot 2$

126. $3x^2(8x - 3) + x^3 \cdot 8$

127. $2(x + 3)(x - 2)^3 + (x + 3)^2 \cdot 3(x - 2)^2$

128. $4(x + 5)^3(x - 1)^2 + (x + 5)^4 \cdot 2(x - 1)$

129. $(4x - 3)^2 + x \cdot 2(4x - 3) \cdot 4$

130. $3x^2(3x + 4)^2 + x^3 \cdot 2(3x + 4) \cdot 3$

131. $2(3x - 5) \cdot 3(2x + 1)^3 + (3x - 5)^2 \cdot 3(2x + 1)^2 \cdot 2$

132. $3(4x + 5)^2 \cdot 4(5x + 1)^2 + (4x + 5)^3 \cdot 2(5x + 1) \cdot 5$

133. Show that $x^2 + 4$ is prime.

134. Show that $x^2 + x + 1$ is prime.

Exercise 9.

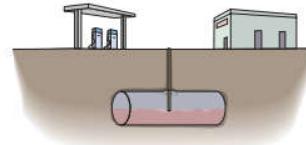
107. **Calculating the Amount of Gasoline in a Tank** A Shell station stores its gasoline in underground tanks that are right circular cylinders lying on their sides. See the illustration. The volume V of gasoline in the tank (in gallons) is given by the formula

$$V = 40h^2 \sqrt{\frac{96}{h} - 0.608}$$

where h is the height of the gasoline (in inches) as measured on a depth stick.

(a) If $h = 12$ inches, how many gallons of gasoline are in the tank?

(b) If $h = 1$ inch, how many gallons of gasoline are in the tank?



HOMEWORKS:

Exercise 4: 17-20,

Exercise 7: 100-102

Exercise 9