

Mathematics 21 - Calculus I

Fall 2005, Lehigh University

Solutions to homework problems. These are short solutions, like those in the back of the book, to homework problems that do not have solutions in the back of the book. (These are for the homeworks that you do but do not turn in.)

Problems not listed have solutions in the back of the text. This is for the first set of homeworks.

Appendix A, # 34: The roots of $(x + 1)(x - 2)(x + 3)$ are $-3, -1, 2$. Construct a table as in examples 3 and 4:

Interval	$(x + 1)$	$(x - 2)$	$(x + 3)$	$(x + 1)(x - 2)(x + 3)$
$x < -3$	—	—	—	—
$-3 < x < -1$	—	—	+	+
$-1 < x < 2$	+	—	+	—
$x > 2$	+	+	+	+

Thus the solution set is $[-3, -1] \cup [2, \infty)$.

Appendix A, # 36: $x^3 + 3x < 4x^2 \Leftrightarrow x^3 - 4x^2 + 3x < 0 \Leftrightarrow x(x^2 - 4x + 3) < 0 \Leftrightarrow x(x - 1)(x - 3) < 0$

Interval	x	$(x - 1)$	$(x - 3)$	$x(x - 1)(x - 3)$
$x < 0$	—	—	—	—
$0 < x < 1$	+	—	—	+
$1 < x < 3$	+	+	—	—
$x > 3$	+	+	+	+

Thus the solution set is $(-\infty, 0) \cup (1, 3)$.

Appendix B, # 32: Lines parallel to the y -axis are vertical lines (with undefined slope). The equation is $x = 4$.

Appendix C, # 4: The distance from the center $(-1, 5)$ to a point $(-4, -6)$ on the circle is $r = \sqrt{(-1 - (-4))^2 + (5 - (-6))^2} = \sqrt{3^2 + 11^2} = \sqrt{130}$. Thus $r^2 = 130$ and an equation is $(x + 1)^2 + (y - 5)^2 = 130$.