Problem 1

Express 2 ≤ x < 5 with a sketch.

Solutions: Easy.

Problem 2

Find the distance and midpoint of the line segment connecting 1 and 8.

Solutions: Distance = 8 − 1 = 7 and midpoint = (1 + 8)/2 = 9/2.

Problem 3

Use whatever notation to list the values of x that satisfy the inequality

\[
\frac{x(x + 2)}{x - 2} \leq 0
\]

Solutions: Thus our critical points are x = −2, 0, 2. Right away we know that x ≠ 2, since the denominator cannot be zero, and we know that x = 0 and x = −2 are solutions since 0 ≤ 0. Now for x > 2, we have

\[
\frac{(+)(+)}{(+)} = (+) \neq 0
\]

hence x > 2 are NOT solutions to our equation. Now for 0 < x < 2, we have

\[
\frac{(+) (+)}{(-)} = (-) < 0
\]

which implies that 0 < x < 2 are solutions to our equation. For −2 < x < 0, we have

\[
\frac{(-)(+)}{(-)} = (+) \neq 0
\]

and so −2 < x < 0 are NOT solutions. Finally for x < −2 we have

\[
\frac{(-)(-)}{(-)} = (-) < 0
\]

which implies that x < −2 are solutions. Therefore our answer is x ∈ (−∞, −2] ∪ [0, 2).
Problem 4

Degree Celsius $C$ and degrees Fahrenheit $F$ are related by the formula $C = \frac{5}{9}(F - 32)$. What is the temperature range in the Celsius scale corresponding to a temperature range in the Fahrenheit of $20 \leq F \leq 50$?

**Solutions:** Since the function is a linear increasing function (i.e. bigger the $F$ means bigger the $C$), we have

$$C_{\text{max}} = \frac{5}{9}(50 - 32) = 10$$

and

$$C_{\text{min}} = \frac{5}{9}(20 - 32) = \frac{-20}{3}$$

Thus the range in Celsius corresponding to the Fahrenheit given above is $C \in [-\frac{20}{3}, 10]$.

Problem 5

indicate on an $xy$-plane those points $(x, y)$ for which $3 \leq |x|$

**Solutions:** See solutions in the back of the book. Remember there is no $y$ in our equation $3 \leq |x|$, so we don’t care what $y$ equals. As long as the $x$-coordinate in the $xy$-plane is satisfied, we are happy.