§6.1 (cont'd)
Select Notes p. 68

$$f(x) = \frac{3}{x-2} \quad g(x) = \frac{3}{x}$$

Domain of \((f \circ g)\)?
\((f \circ g)(x) = f(g(x))
= f\left(\frac{3}{x}\right)
= \frac{8}{\frac{3}{x} - 2}

Stop and determine domain of
\[
\frac{8}{\frac{3}{x} - 2}
\]

1) Start w/ \((-\infty, +\infty)\)
2) Look for \(\text{even } \sqrt{\text{radicand}}\) if any, \(\text{radicand} > 0\)
3) Look for \(\text{frac } / \text{div}\) If any, \(\text{denom} \neq 0\)
   - Sol'ns are "bad numbers"

1) \((-\infty, 0)\)
2) \(N/A\)
3) \(\text{denom} \neq 0\)

\[
\frac{8}{\frac{3}{x} - 2}
\]
\[ f(x) = \frac{8}{x-2} \quad g(x) = \frac{3}{x} \]

Domain of \((f \circ g)\)?
\[(f \circ g)(x) = f(g(x)) = f\left(\frac{3}{x}\right) = \frac{8}{\frac{3}{x} - 2} \]

Stop and determine domain of
\[\frac{8}{\frac{3}{x} - 2} \]

1) Start with \((-\infty, +\infty)\)
2) Look for even \(\sqrt{\text{radicand}}\) if any, radicand > 0
3) Look for frac/div. If any, denom \(\neq 0\)

So, ns are "bad numbers"

1) \((-\infty, \infty)\)
2) N/A
3) Denom \(\neq 0\)
\[ x \neq 0 \]

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

\[ \frac{x}{-2} + 2 \]

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

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

\[ x = \frac{3}{2} \] is a bad number.

坏数字: 0, \( \frac{3}{2} \)

域

\[ \left\{ x \mid x \text{ is real, } x \neq 0, x = \frac{3}{2} \right\} \]

\[ (-\infty, 0) \cup \left( 0, \frac{3}{2} \right) \cup \left( \frac{3}{2}, \infty \right) \]
c = only variable is p

38) Find (CP) and its domain when
   \( p = \text{price} \)
   \( x = \text{quantity sold} \)

Domain equation
   \[ p = -\frac{1}{q} x + 200 \quad 0 < x < 1800 \]

Cost equation
   \[ C(x) = \frac{\sqrt{x}}{200} + 500 \]

What two steps do we take to get
   \( C = \text{(only variable is p)} \)?

1. Solve for \( x \) in demand eq'n.

2. Substitute for \( x \) in the cost equation
   \[ p = -\frac{1}{q} x + 200 \]

Goal \( x = \)
\[ p = -\frac{1}{q} x + 200 \]
\[ \frac{-200}{-1} \quad -200 \]
\[ ( \frac{p-200}{-1} = -\frac{1}{q} x \cdot (-1) \]
\[ p - 200 = \frac{1}{q} \]

\[ 9(p - 200) = x 
\]

\[ x = \frac{9(p - 200)}{1 - 1} \]

\[ C(x) = \sqrt{\frac{x}{200}} + 600 \]

\[ C(p) = \sqrt{\frac{9(p - 200)}{1 - 1}} + 600 \]

Find domain of \( C(p) \):

1. \( (-\infty, \infty) \)
2. Look for \( \sqrt{ } \) radical

\[ 9(p - 200) \geq 0 \]

\[ p - 200 \leq 0 \]

\[ p \leq 200 \]

\[ 0 \leq p \leq 200 \]
1. \[ g(p - 200) = \frac{9}{p - 1} \]

2. \[ \sqrt{\frac{9(p - 200)}{200}} + 600 \]

So step 3 is N/A.

3. \[ 0 \leq p \leq 200 \]

20. \( f(x) = x^2 \)  \quad \( g(x) = x^2 + 6 \)

Find the domain of \( g \circ f \).

\[(g \circ f)(x) = g(f(x)) \]

\[ g(x^2) = g(x^2) \]

Check point: \[ (\sqrt{x^2})^2 + 6 \]

\[(g \circ f)(x) = x^4 + 6 \]

Domain: all real numbers

The domain of any polynomial is all real numbers.
24) \( g(x) = \sqrt{x - 4} \) \( f(x) = x^2 + 7 \)

\((f \circ g)(x)\) and its domain?

\((f \circ g)(x) = f(g(x))\)

\[ f\left(\sqrt{x - 4}\right) \]

\[ \sqrt{x - 4}^2 + 7 \]

\[ \left(\sqrt{x - 4}\right)^2 + 7 \]

1. \((-\infty, \infty)\)

2. \(\sqrt{\text{radicand}} \geq 0\)

3. Look for fractions/division

\[ \sqrt{x - 4}; \]

\[ x - 4 \geq 0 \]

\[ x \geq 4 \]

Domain \( x \geq 4 \)

\([4, \infty)\)
\[(g \circ g)(x) = g \left( g(x) \right)\]
\[= g \left( -\sqrt{x - 4} \right)\]
\[= \sqrt{\sqrt{x - 4} - 4}\]

1. \([-\infty, \infty]\)
2. Look even \[\text{radicand} \]

Green:
\[x - 4 \geq 0\]
\[x \geq 4\]

Blue:
\[\sqrt{x - 4} - 4 \geq 0\]
\[\frac{1}{16} + 4\]
\[\left(\sqrt{x - 4}\right)^2 \geq (4)^2\]
\[x - 4 \geq 16\]
\[x \geq 20\]

\[x \geq 4 \text{ and } x \geq 20\]
\[\boxed{x \geq 20}\]

Domain:
\[x \geq 20\]