1. Find how much N, P, K, and potentially S are needed given Soil Test 1 and Soil Test 2 values:
   a. Using the NDSU soil guide, how much nitrogen would you have to apply for malting grade barley in warmer drier climates if you have done no-till for greater than 10 years?

   b. Using the NDSU soil guide, how much P2O5 would you have to apply for malting grade barley in warmer drier climates if you have done no-till for greater than 10 years?

   c. Using the NDSU soil guide, how much K2O would you have to apply for malting grade barley in warmer drier climates if you have done no-till for greater than 10 years?

2. Find how much N, P, K, and potentially S are needed given Soil Test 1 and Soil Test 2 values:
   a. Using the NDSU soil guide, how much nitrogen would you have to apply for canola in a cooler and moister environment?

   b. Using the NDSU soil guide, how much P2O5 would you have to apply for canola in a cooler and moister environment?

   c. Using the NDSU soil guide, how much K2O would you have to apply for canola in a cooler and moister environment?

   d. Using the NDSU soil guide, how much sulfur would you have to apply for canola in a cooler and moister environment?

3. Find how much N, P, K, and potentially S are needed given Soil Test 1 and Soil Test 2 values:
   a. Using the NDSU soil guide, how much nitrogen would you have to apply for no-till safflower?

   b. Using the NDSU soil guide, how much P2O5 would you have to apply for no-till safflower?

   b. Using the NDSU soil guide, how much K2O would you have to apply for no-till safflower?
4. Find how much N, P, K, and potentially S are needed given Soil Test 1 and Soil Test 2 values:
   a. Using the NDSU soil guide, how much nitrogen would you have to apply for no-till sorghum?
   b. Using the NDSU soil guide, how much P2O5 would you have to apply for no-till sorghum?
   c. Using the NDSU soil guide, how much K2O would you have to apply for no-till sorghum?
   d. Using the NDSU soil guide, how much K2O would you have to apply for no-till sorghum?

5. Find how much P and K and potentially S are needed given Soil Test 1 and Soil Test 2 values:
   a. Using the NDSU soil guide, how much P2O5 would you have to apply for soybeans?
   b. Using the NDSU soil guide, how much K2O would you have to apply for soybeans?

6. Find how much N, P, K, and potentially S are needed given Soil Test 1 and Soil Test 2 values:
   a. Using the NDSU soil guide, how much nitrogen would you have to apply for tilled ground planted in buckwheat?
   b. Using the NDSU soil guide, how much P2O5 would you have to apply for tilled ground planted in buckwheat?
   c. Using the NDSU soil guide, how much K2O would you have to apply for tilled ground planted in buckwheat?

7. Find how much N, P, K, and potentially S are needed given Soil Test 1 and Soil Test 2 values:
   a. Using the NDSU soil guide, how much nitrogen would you have to apply for tilled ground planted in silage corn?
   b. Using the NDSU soil guide, how much P2O5 would you have to apply for tilled ground planted in silage corn?
   c. Using the NDSU soil guide, how much K2O would you have to apply for tilled ground planted in silage corn?
1. **Soil #1**

- $N$: 19 lbs/acre
- $P$: 9 ppm
- $K$: 189 ppm

**Chart**

$$N = 70\text{lbsN} - 19\text{lbsN}$$

Soil Test

$$P = \frac{51}{\text{lbsN}}$$

**Soil #2**

- $N$: 81 lbs/acre
- $P$: 43 ppm
- $K$: 203 ppm
2. Soil #1

\[
\begin{align*}
N & \quad 150 - 19 = 131 \text{ lbs} \\
P & \quad 9 \text{ ppm} \quad 28 \text{ lbs} \\
K & \quad 189 \text{ ppm} \quad 0 \text{ lbs} \\
S & \quad 20165 \text{ S} \\
\end{align*}
\]

Soil #2

\[
\begin{align*}
150 - 81 = 69 \text{ lbs N} \\
43 \text{ ppm} \quad 0 \text{ lbs} \\
203 \text{ ppm} \quad 0 \text{ lbs} \\
(20165) \\
\end{align*}
\]

3. Soil #1

\[
\begin{align*}
N & \quad 80 - 30 - 19 = 31 \text{ lbs} \\
P & \quad 9 \text{ ppm} \quad 30165 \text{ lbs} \\
K & \quad 149 \text{ ppm} \quad 0 \\
\end{align*}
\]

Soil #2

\[
\begin{align*}
80 - 30 - 81 = 0 \text{ lbs} \\
43 \text{ ppm} \quad 0 \\
203 \text{ ppm} \quad 0 \\
\end{align*}
\]
4. Soil #1

\[\begin{align*}
N & \quad 19 \text{ lbs/acre} \\
P & \quad 9 \text{ ppm} \\
K & \quad 189 \text{ ppm}
\end{align*}\]

Chart

\[\begin{align*}
N & \quad 120-30 - 19 \text{ \quad No-till \quad Soil test} \\
P & \quad 39 \text{ lbs/acre} \\
K & \quad 0
\end{align*}\]

Soil #2

\[\begin{align*}
N & \quad 81 \text{ lbs/acre} \\
P & \quad 43 \text{ ppm} \\
K & \quad 203 \text{ ppm}
\end{align*}\]

\[\begin{align*}
N & \quad 120-30 - 81 \text{ \quad No-till \quad Soil test} \\
P & \quad 0 \\
K & \quad 0
\end{align*}\]
5. Soil #1
   P: 52 lbs
   K: 0

   Soil #2
   P: 0
   K: 0

6. See previous problems for soil test values

   Soil Test 1
   N: 80 lbs - 19 lbs
     61 lbs N/acre
   P: 2016 lbs P2O5/acre
   K: 0

   Soil Test 2
   N: 80 lbs - 89 lbs soil = (0.165 N)
   P: 0
   K: 0

7. #1
   N: 180 lbs N - 19 lbs N
     161 lbs N/acre
   P: 4016 lbs P2O5/acre
   K: 0

   #2
   N: 130 lbs N - 81 lbs N
     99 lbs N/acre
   P: 0
   K: 0