College Algebra

1. next term = previous term * \((-\frac{1}{4})\) = \((-\frac{1}{4})\) * \((-\frac{1}{4})\) = \(\frac{1}{16}\)

2. # of tons processed by process A
   in 7 days = \(A(7) = 7^2 + (2)(7) = 49 + 14 = 63\)
   # of tons processed by Process B
   in 7 days = \(B(7) = 10 \cdot 7 = 70\)
   maximum output = 70

3. \(g(f(3)) = g(2) = -3\)

4. \(\sqrt[6]{x^3 y^4 z^5} = x^{3/6} y^{4/6} z^{5/6} = x^{1/2} y^{2/3} z^{5/6}\)

5. \[
\begin{bmatrix}
2 - (-2) & (-4) - (4) \\
6 - (-6) & (0) - (0)
\end{bmatrix} = \begin{bmatrix} 4 & -8 \\ 12 & 0 \end{bmatrix}
\]

6. \[
A \cdot f(g(x)) = f(cx) = 2^{cx} \\
B \cdot f(g(x)) = f(c/x) = 2^{c/x} \\
C \cdot f(g(x)) = f(x/c) = 2^{x/c} \\
D \cdot f(g(x)) = f(x-c) = 2^{x-c} \\
E \cdot f(g(x)) = f(\log_c x) = 2^{\log_c x}
\]

For \(c > 1\) and \(x > 1\) (A) yields the greatest value for \(f(g(x))\) which is \(2^{cx}\)

7. \(f(0) = f(0+0) = f(0) + f(0)\) by given relation
   i.e., \(f(0) = 2f(0)\)

So, the possible values of \(f(0)\) is 0 only.

8. Note that \(i + i^2 + i^3 + i^4 = i - 1 - i + 1 = 0\)
   Sum of the next four terms \(i^5 + i^6 + i^7 + i^8\) is also zero, and so on
   So, \((i + i^2 + i^3 + \ldots + i^{48}) + i^{49} = 0 + i^{49} = i^{49} = (i^{48})(i) = (i^4)^{12}(i) = 1(i) = i\)
9. If \(a\) is the 1st term and \(b\) is the common difference of an arithmetic series, then,

\(i^{th}\) term of the series is \(a + (i - 1)b\)

If the series has \(n\) terms, then the last term of the series is \(a + (n - 1)b\)

The difference between the last term and the first term is

\([a + (n - 1)b] - a = (n - 1)b = 136 - 3 = 133\)

Now the sum of the series is

\[
\sum_{i=1}^{n} a + (i - 1)b = na + b\{0 + 1 + 2 + \ldots + (n - 1)\}
\]

\[= na + \frac{(n - 1)n}{2}b\]

Given, \(na + \frac{n(n-1)}{2}b = 1390\), since \((n - 1)b = 133\) and \(a = 3\)

\(3n + \frac{n\cdot133}{2} = 1390\), \(139n = 2(1390)\), \(n = 20\). Then using again \((n - 1)b = 133\)

\(19b = 133\), \(b = 7\), The first 3 terms are 3, 10, 17