1. \[ f(x) = \frac{(x - 4)(x + 1)}{(2x - 3)(x + 1)} = \frac{x - 4}{2x - 3}, \, x \neq -1. \]

Since there is a hole at \( x = -1 \), \( A = \frac{(-1) - 4}{2(-1) - 3} = 1. \)

\( B = f(4) = 0. \)

Since there is an asymptote at \( x = 1.5 \), either sketch a graph or plug in a number very close to (but greater than) 1.5 to find that \( C = -\infty. \)

To find the horizontal asymptote \( y = D \), divide the leading coefficients. \( D = \frac{1}{2}. \)

\[ g(A) + 2g(B) + 3g(C) + 4g(D) = 1 + 0 - 15 + 2 = -12 \]

2. \( A = -\frac{2}{3}, \quad B = 2, \quad C = \frac{4}{3} \quad \frac{AB}{C} = -1. \)

3. \( A = 3, \quad B = \pi, \quad C = 1 \quad ABC = 3\pi. \)

4. \[ A = \frac{(12)(8) + (5)(6)}{(13)(10)} = \frac{63}{65}, \quad B = \frac{9}{40}, \quad C = \sqrt{3}, \quad D = \frac{\sqrt{5}}{2}. \quad \frac{AC^2}{BD^2} = \frac{672}{65} \]

5. \[ A = \left( \frac{4}{10} \right)\left( \frac{3}{9} \right) = \frac{2}{15}. \quad B = \text{prob(white, then black)} + \text{prob(black, then white)} = \left( \frac{4}{10} \right)\left( \frac{6}{10} \right) + \left( \frac{6}{10} \right)\left( \frac{4}{9} \right) = \frac{38}{75}. \]

\[ C = \text{prob(white sock, then rock)} + \text{prob(black sock, then rock)} = \left( \frac{3}{10} \right)\left( \frac{3}{10} \right) + \left( \frac{4}{10} \right)\left( \frac{3}{9} \right) = \frac{67}{300}. \]

\[ D = \left( \frac{3}{10} \right)\left( \frac{3}{10} \right) = \frac{9}{100}. \quad A + B + C + D = \frac{143}{150} \]

6. \( m = 8, \quad n = -28. \quad \text{Solving } 10 - 4p = 0, \quad p = \frac{5}{2}. \quad \text{Solving } \frac{-1}{5} = \frac{5}{t}, \quad t = -25. \quad \frac{n - t}{m - p} = \frac{13}{2} \]

7. \[ \ln 2 = \frac{\log 2}{\log e} = \frac{\log 2}{\ln e} = \frac{3}{10} \quad = \frac{69}{100}. \]

\[ \log_{10} \frac{1}{4} = -2 \log 2 = -0.6 \]

\[ \ln 50 = \ln 100 - \ln 2 = 2 \ln 10 - \ln 2 = 4.6 - 0.69 = 3.91 \]

\[ \log_{10} \frac{1}{4} - \ln 50 = 3.31. \]
8. Keep dividing 6240 by 5, and add the integral quotients until the quotient is zero. \( A = 1307 \)

\[
6240 = \left(2^3 \right) \left(3^3 \right) \left(5^1 \right) \left(13^1 \right), \text{ so by the counting principle} \quad B = (5+1)(1+1)(1+1)(1+1) = 48
\]

Starting with \( \frac{80^2}{8} = 6400 \), use trial and error to find that \( C = 6084 \).

\[
D = \left(1 - \frac{1}{5} \right) \left(1 - \frac{1}{10} \right) (6240) = 1716 . \quad A + B + C + D = 9155
\]

9. By the law of sines, \( \frac{A}{\sin 100^\circ} = \frac{14}{\sin 50^\circ} \), so \( A = \frac{441}{25} \).

By law of sines, \( \frac{B}{\sin 30^\circ} = \frac{14}{\sin 50^\circ} \), so \( B = 9 \).

By the law of cosines, \( C^2 = 100 + 196 - 2(10)(14)\cos 50^\circ = \frac{584}{5} \)

\[
25A + B + 5C^2 = 1034
\]

10. \( PQ = \begin{bmatrix} 5 & 4 \\ -5 & 8 \end{bmatrix} \quad P^{-1} = \begin{bmatrix} 0.3 & 0.1 \\ -0.4 & 0.2 \end{bmatrix} \quad Q^T = \begin{bmatrix} 1 & -3 \\ 2 & 0 \end{bmatrix} \cdot a + d = 6.3 + 8.2 = 14.5
\]

11. Set \( S \) contains \( \text{cis} \left(\frac{k\pi}{6}\right) \), for all integral multiples of \( k \).

So \( S \cap T = \left\{ \text{cis} \left(\frac{5\pi}{6}\right), \text{cis} \left(\frac{4\pi}{3}\right), \text{cis} \left(\frac{3\pi}{2}\right) \right\} = \left\{ -\frac{\sqrt{3}}{2} + \frac{i}{2}, -\frac{1}{2} - \frac{i\sqrt{3}}{2}, -i \right\} \). Of these elements, only the last two are in set \( R \).

12. Solving \( 3x - 1 = 2x^2 - 2x - 4 \), \( x = -\frac{1}{2} \text{ or } 3 \). Substituting, the intersection points are \( \left( -\frac{1}{2}, -\frac{5}{2} \right) \text{ and } (3, 8) \).

The distance between the points is \( \frac{7\sqrt{10}}{2} \). \( g(x) - f(x) + k = 2x^2 - 5x + (k - 3) \). Setting the discriminant equal to zero, \( 25 - 4(2)(k - 3) = 0 \), find that \( B = k = \frac{49}{8} \). \( C = -\frac{40}{9} \). \( \frac{9BC\sqrt{10}}{A} = -700 \)

13. Complete the square to get \( (x - 6)^2 + (y + 8)^2 = 121 \). \( Sa = 121, B = 6 \) (from center \( (6, -8) \)) \( C = 10 \) and \( E = 22. \) The sum is 159.

14. 531 and 532 are not prime. So the next largest is 523 which is prime. So \( A = 523 \).

5321 base eight is 2769 base ten. \( C:D = 3:1 \). So 523, 2769, 3 = 3295.

15. \( 4t - t^2 = 3 \) when \( t = 1 \text{ or } t = 3 \). So \( y(1) = 1 \) and twice that is 2.
B: \(x(2), y(2) = (4, 0)\) and \(d=4\).

C: at the max of \(x\), we have vertex when \(t=2\) (halfway between roots) and \(y(2)=0\).

D: at \(t=1\) \((3,1)\) and at \(t=2\) \((4, 0)\) gives \(d=\sqrt{2}\).

Final: \(2+4+0+2 = 8\).