1 First Transpose the matrix $\Rightarrow$

$\begin{bmatrix} 1 & 4 & 2 \\ -2 & 1 & -1 \\ 3 & 6 & 6 \end{bmatrix}^{-1}$ take inverse $\Rightarrow \frac{1}{6}\begin{bmatrix} 4 & -4 & -2 \\ 3 & 0 & -1 \\ -5 & 2 & 3 \end{bmatrix}$

take determanit $\Rightarrow \boxed{\frac{1}{18} = A}$

Set the $\det(B) = 0$ and solve for x.

$0 = x^3 - 3x^2 + \ldots\ldots + 362$

Sum $= 3 = B$

$\frac{1}{(1/6)(3)} = \boxed{6}$

2

$X = 4\cdot 8^2 + 3\cdot 8 + 2\cdot 8^0 = n^2+8n+9$

$282 = n^2+8n+9$

$0 = n^2+8n-273$ $\boxed{x = 13}$ or ~~$x = -21$~~

$Y = 2^7 + 2^4 + 2^3 + 2^2 + 2^1$

$158 \Rightarrow N_{16}$ $\quad 16\cdot 9 + 14 = 158$

$11 = A, 12 = B$ $\quad 16\cdot 0 + 9 = 9$ ↑

$13 = C \ldots$ $\quad 9D_{16}$

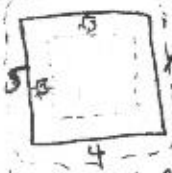
$\boxed{(13, 9D_{16}) \text{ or } (13, 9D)}$

3 $A = a = \sqrt{12}$ $b = \sqrt{3}$ Area $= 6\pi$

$B = \frac{c}{a} = \frac{\sqrt{3}}{2}$ $c = a(1-e^2) = \sqrt{3}/2$

$D =$ where $y = 0$ $x^2+4x+28 = 0$ $\boxed{-4}$

$\boxed{\frac{9\pi}{2} - 4 \text{ or } \frac{9\pi - 8}{2}}$

4 

Center of coin must land in smaller dotted region

$\text{Area}_1 = (5-2\sqrt{3})(4-2\sqrt{3})$

Larger dotted region is total space in which the center could fall. It is $\sqrt{3}$ units from table $\text{Area}_2 = (4+2\sqrt{3})5 + 4\cdot 2\sqrt{3} + (\sqrt{3})^2\pi$

$\frac{\text{Area}_1}{\text{Area}_2} = \frac{32 - 18\sqrt{3}}{18\sqrt{3} + 3\pi + 20}$

5 $A = \sum_{k=1}^{\infty}\left(\frac{1}{2^k} + \frac{1}{k!}\right) = \frac{1}{1-1/2} + e - 1 = e$

$B = \sum_{k=1}^{10^6}\left(2k + \frac{1}{3^k}\right) \approx \frac{2\cdot 10^6(10^6+1)}{2} + \frac{1/3}{1-\frac{1}{3}}$

$= 10^{12} + 10^6 + \frac{1}{2}\lfloor B \rfloor = 10^{12} + 10^6 + 10^0 \rightarrow$

$1000001000001 + e = A + C$

6 $\frac{x^5+7x^4+16x^3+11x^2-69x-195}{x^2+7x+12} =$

$x^3 + 4x - 17 + \frac{2x+9}{x^2+7x+12}$

$x^3+4x-17 =$ slant asymptote $= f^{-1}(x)$

$f(22)$ is the x value that makes $f^{-1}(x) = 22$ $\quad x^3+4x-17 = 22 \rightarrow x = 3$

$\boxed{f(22) = 3}$

7 $u\cdot v = -8 + 16 - 1 = 7$

$\|w\| = 5$ $\quad A = 7\cdot 5 = 35$

$B = \frac{v\cdot w}{\|v\|\cdot\|w\|} = \cos(\theta^\circ)$ $\quad v\cdot w = 6 - 16 + 0 = -10$ $\quad \|w\| = 5$ $\quad \|v\| = \sqrt{21}$

$= \frac{-10}{5\sqrt{20}} = -\frac{2\sqrt{21}}{21}$

$C = \text{abs}\begin{vmatrix} 4 & 4 & -1 \\ -2 & 4 & 1 \\ -3 & \ldots & \end{vmatrix} = 16$

$\frac{B}{A} + C = 16 - \frac{2\sqrt{21}}{735}$

8 A, when x is really big or small $\rightarrow \infty$

B, ratio of leading coefficients $\rightarrow \frac{1}{2}$

$\frac{\cos(2x)\sin(2x)}{\tan(3x)} = \frac{\cos 3x \cos 2x \sin 2x}{\sin 3x} = \frac{2}{3} = C$

9) $10{,}000 = e^{15 r_{bac}}$

$r_{bac} = \frac{\ln(10{,}000)}{15}$

$15000 = e^{20 r_{teria}}$ $r_{teria} = \frac{\ln 15000}{20}$

$\frac{\left(\frac{\ln(10{,}000)}{15}\right)}{\left(\frac{\ln(15000)}{20}\right)} = \frac{\frac{4}{15}\ln 10}{\frac{1}{20}\ln(15000)} = \boxed{\frac{16\ln 10}{3\ln 15000}}$

10) A) 2. $f(kx) = 5(kx) = k(5x)$

B) True $2+2 = \boxed{4}$

11) $Cost(t) = R(t) - P(t)$

$Cost(t) = 12t^2 - 960t + 800$

Find x coord of vertex for min

$x = -\frac{b}{2a} = \frac{960}{24} = \boxed{40 \text{ hours}}$

12) $\frac{1}{\csc x - 1} - \frac{1}{\csc x + 1}$

$\frac{1}{\csc x - 1}\left(\frac{\csc x + 1}{\csc x + 1}\right) - \frac{1}{\csc x + 1}\left(\frac{\csc x - 1}{\csc x - 1}\right)$

$\frac{\csc x + 1}{\csc^2 x - 1} - \frac{\csc x - 1}{\csc^2 x - 1}$

$\frac{2}{\csc^2 x - 1} = \frac{2}{\cot^2 x} = \boxed{2\tan^2 x}$

13) $h(-1) = -2^{-5} = -\frac{1}{32}$

$g\left(-\frac{1}{32}\right) = \frac{2143}{1024}$

$f\left(\frac{2143}{1024}\right) \approx 2.84 \approx \boxed{3}$

14) discriminant $= 16^2 - 4(4)(17) = -16 < 0$

$\boxed{\text{complex distinct}}$

15) $f(x) = Ax^3 + Bx^2 + Cx + D$

sum of roots taken 2 at a time $= \frac{C}{A}$

$= \frac{16}{1} = \boxed{16}$