Log Test Part 1

a) $\log_5(25\sqrt[3]{125})$

$= \log_5 25 + \log_5 \sqrt[3]{125}$

$= 2 + \log_5 5$

$= 2 + 1$

$= 3$

b) $\log_{128} 2$

$= \frac{\log 2}{\log 128}$ $^{-1}$

$= \frac{\log 128}{\log 2}$ $^{-1}$

$= \log_2 128$ $^{-1}$

$= 7^{-1}$

$= \frac{1}{7}$

c) $\ln(e^{\frac{2}{5}})$

$= \log_e(e^{\frac{2}{5}})$

$= \frac{2}{5}$

d) $2^{\log_2 3}$ 2 inverse operation

$= 3$

e) $\log_2(\log_2(\frac{1}{16}))$

$= \log_2(\log_2(16^{-1}))$

$= \log_2(-4)$

Not possible because you cannot take the log of a negative number

f) $\frac{\log_{243} 1024}{\log_{81} 256}$

$= \frac{\log 1024}{\log 243} \times \frac{\log 81}{\log 256}$

$= \frac{\log 1024}{\log 256} \cdot \frac{\log 81}{\log 243}$

$= \frac{\log_{256} 1024}{\log_{243} 81}$

$= \frac{\log_{2^8} 2^{10}}{\log_{3^5} 3^4}$

$= \frac{\frac{10}{8}}{\frac{4}{5}}$

$= \frac{5}{4}^2$

$= \frac{25}{16}$

g) $\log_1 9 - \log_1 3$

Not possible because no exponent can make any number other than 1

h) $(\log_4 80 - \log_4 5)(\log_{30} 18 + \log_{30} 50)$

$= \log_4 \left(\frac{80}{5}\right) \log_{30} (18 \cdot 50)$

$= \log_4 16 \log_{30} 900$

$= 2 \cdot 2$

$= 4$

i) $5^{\log_{\frac{1}{\sqrt{5}}} \left(\frac{1}{2}\right)}$

$= 5^{-\frac{1}{3} \log_5 \frac{1}{2}}$

$= \frac{1}{2}^{-\frac{1}{3}}$

$= 2^{\frac{1}{3}}$

$= \sqrt[3]{2}$

Log Test Part 1

j) $81^{\log_{27} 64}$

$= 3^{\log_{27} 64} \cdot 27^{\log_{27} 64}$

$= 3^{\log_{27} 64} \cdot 64$

$= 3^{\frac{1}{3}\log_3 64} \cdot 64$

$= 64^{\frac{1}{3}} \cdot 64$

$= 4 \cdot 64$

$= 256$

k) $\frac{1}{2}\log_4 8 + \frac{3}{2}\log_4 36 - 3\log_{4^4} 81$

$= \frac{1}{2}\log_4 8 + \frac{3}{2}\log_4 36 - \frac{3}{4}\log_4 81$

$= \log_{64} 8 + \frac{3}{2}\log_4 36 - \frac{3}{2}\log_4 9$

$= \frac{1}{2}$

2) $6^0 = 1$

$6^1 = 6$

since 2 is in between 1 and 6, $\log_6 2$ is in between 0 and 1

3) $\ln(a^5 b^3)$

$= 5\ln(a) + 3\ln(b)$

$= 5(2) + 3(4)$

$= 10 + 12$

$= 22$

4) $\log_x y^4 = m^3$

$4\log_x y = m^3$

5a) $2\log_5(x^2+7x) - \log_5(x^2+7x) = \log_5 8$

$\log_5((x^2+7x)(x^2+7x)\div(x^2+7x)) = \log_5 8$

$\log_5(x^2+7x) = \log_5 8$

$x^2+7x = 8$

$\frac{-7\pm\sqrt{7^2-4(1)(a)}}{2(1)} = 8$

$x = 1, -8$

b) $\log_4 2^{2^x} = \log_4 2^{4^{(x+1)}}$

$2^x = 4^{(x+1)}$

$2^x = 2^{2(x+1)}$

$x = 2(x+1)$

$x = 2x+2$

$-x = 2$

$x = -2$

Log Test Part 2

1a) $x^{5.3} = 63$

$\log_x 63 = 5.3$

$\frac{\log 63}{\log(x)} = 5.3$

$\frac{\log x}{\log 63} = \frac{10}{53}$

$\log x = \log 63 \cdot \frac{10}{53}$

$10^{\log 63 \cdot \frac{10}{53}} = x$

$x \approx 2.19$

b) $\log_4 50 = 4x$

$x = \frac{\log_4 50}{4}$

$x \approx 0.71$

c) $3^{x-2} = 10$

$3^x \div 3^2 = 10$

$3^x = 90$

$\log_3 90 = x$

$x = 4.10$

~~d) $3.1^{x+1} = 6(4.1)^{2x}$~~

e) $\log_3 41 = x$

$x = 3.38$

2) $1870 = \frac{1}{2} \cdot 8.8(12)^N$

$425 = 12^N$

$\log_{12} 425 = N$

$N = 2.44$

3)