1 (a) TRUE (b) FALSE (c) TRUE

2 (a) $\frac{d}{dx}\int_2^x \cosh(s)\,\log_4(s^2)\,ds = \boxed{\cosh(x)\,\log_4(x^2)}$

(b) $\ln e^x = x \Rightarrow \frac{d}{dx}(\ln e^x) = 1 \Rightarrow \frac{1}{e^x}\frac{d}{dx}(e^x) = 1$

$$\boxed{\frac{d}{dx}e^x = e^x}$$

(c) $$\boxed{w'(x) = \frac{1}{\arctan(x^2)}\,\frac{1}{1+x^4}\,2x}$$

3 (a) LET $u(t) = 1+\sqrt{t}$; $\frac{du}{dt} = \frac{1}{2\sqrt{t}} \Rightarrow 2\frac{du}{dt} = \frac{1}{\sqrt{t}}$ $u(1)=2$; $u(4)=3$

$$\int_1^4 \frac{1}{\sqrt{t}(1+\sqrt{t})}\,dt = 2\int_1^4 \frac{1}{u}\frac{du}{dt}\,dt = 2\int_2^3 \frac{1}{u}\,du = 2\left[\ln|u|\right]_2^3$$

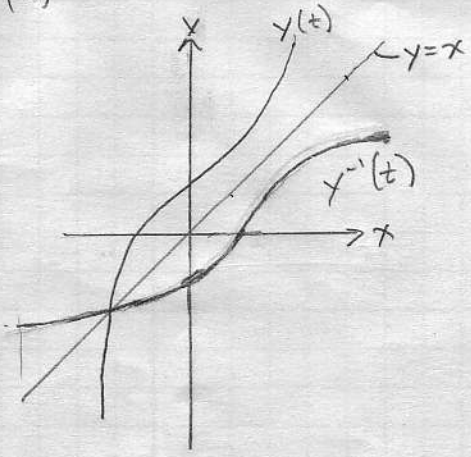
$$= \boxed{2(\ln(3)-\ln(2))} = \ln\left(\frac{9}{4}\right)$$

(b) $$\int \frac{1}{\sqrt{9-9w^2}}\,dw = \frac{1}{3}\int \frac{1}{\sqrt{1-w^2}}\,dw = \boxed{\frac{1}{3}\arcsin(w) + C}$$

4 (a) $y = \frac{4\theta-1}{2\theta+3} \Rightarrow (2\theta+3)y = 4\theta-1 \Rightarrow \theta(2y-4) = -3y-1$

$$\theta = \frac{-3y-1}{2y-4} \Rightarrow \boxed{m^{-1}(\theta) = \frac{-3\theta-1}{2\theta-4}}$$

(b)



5 ASSUME THAT BACTERIA GROWTH IS GOVERNED BY $y(t) = Ce^{kt}$, WHICH IS TO SAY IT IS GOVERNED BY THE DIFF. EQN $\frac{dy}{dt} = ky$

FROM STATEMENT: $C = 100$ BACTERIA

$y(t) = 100e^{kt}$; $y(1) = 100e^k = 400$

$k = \ln(4)$ $^1/_{\text{HOURS}}$;

$$\boxed{y(10) = 100\,e^{10\ln(4)} \text{ BACTERIA}}$$

OR $y(10) = 100 \cdot 4^{10}$ BAC.