(1) [3 points] Find the derivative of $H(t) = \tanh(e^t)$.

$$H'(t) = \operatorname{sech}^2(e^t) \cdot e^t$$

(2) [3 points] Find the derivative of $y = e^{\cosh(7x)}$.

$$y' = e^{\cosh(7x)} \cdot \sinh(7x) \cdot 7$$

(3) [5 points] Find the limit: $\lim_{x\to 1} \dfrac{1-x+\ln x}{1+\cos(\pi x)}$. $\rightsquigarrow \frac{"0"}{0}$

$$\overset{H}{=} \lim_{x\to 1} \frac{-1+\frac{1}{x}}{-\pi\sin(\pi x)} \rightsquigarrow \frac{"0"}{0}$$

$$\overset{H}{=} \lim_{x\to 1} \frac{-\frac{1}{x^2}}{-\pi^2\cos(\pi x)}$$

$$= \frac{(-\frac{1}{1})}{\pi^2} = \boxed{\frac{-1}{\pi^2}}$$

(4) [4 points] Find f if $f'(x) = \sqrt{x}(6+5x)$ and $f(1) = 10$.

$$f'(x) = x^{1/2}(6+5x) = 6x^{1/2} + 5x^{3/2}$$

$$\therefore \quad f(x) = 6\frac{x^{3/2}}{(3/2)} + 5\frac{x^{5/2}}{(5/2)} + C = 4x^{3/2} + 2x^{5/2} + C$$

$f(1) = 10$, so

$$10 = 4(1)^{3/2} + 2(1)^{5/2} + C$$

$$\therefore \quad C = 10 - 4 - 2 = 4$$

$$\therefore \quad f(x) = 4x^{3/2} + 2x^{5/2} + 4.$$