

1. Evaluate:

$$a) 125^{2/3} = \left(\sqrt[3]{125}\right)^2 = (5)^2 = \boxed{25}$$

$$b) \left(\frac{e^2}{\sqrt{e}}\right)^{4/3} = \left(\frac{e^2}{e^{1/2}}\right)^{4/3} = \left(e^{2 - 1/2}\right)^{4/3} = e^2 \leftarrow \frac{3}{2} \cdot \frac{4}{3}$$

$$c) \ln e^{5x} = \boxed{5x} \quad \left(\text{OR } \ln e^{5x} = 5x \ln e = 5x \cdot 1 = 5x\right)$$

2. Expand: $\ln\left(\frac{x^3}{(x-2)\sqrt{1+x^2}}\right)$

$$= \ln x^3 - \ln(x-2) - \ln(1+x^2)^{1/2}$$

$$= \boxed{3 \ln x - \ln(x-2) - \frac{1}{2} \ln(1+x^2)}$$

3. Solve: $5 + 5e^{-0.1x} = 15$

$$5e^{-0.1x} = 10$$

$$e^{-0.1x} = 2$$

$$\ln e^{-0.1x} = \ln 2$$

$$-0.1x = \ln 2$$

$$\boxed{x = -\frac{\ln 2}{0.1}}$$

4. Solve: $2 \ln(3x) - 1 = 7$

$$\frac{2 \ln(3x)}{2} = \frac{8}{2}$$

$$e^{\ln(3x)} = e^4$$

$$3x = e^4$$

$$x = \frac{e^4}{3}$$

Q: A man rode his horse into town on Tuesday. Two days later he rode home on Tuesday. How is this possible?