1. Use your TI-89 to check your answers.
2. Use your TI-89 to check your answers.
3. Use your TI-89 to check your answers.
4. Use your TI-89 to check your answers.
5. Use your TI-89 to check your answers.
6. Use your TI-89 to check your answers.
7. $\lim_{x\to\infty}(1.1)^x = +\infty$
8. With limits of this type, rewrite without negative exponents and remember that $\dfrac{1}{e^{ax}} \longrightarrow 0$ as x gets huge.

$$\lim_{x\to\infty}\frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = \lim_{x\to\infty}\frac{e^{3x}-\dfrac{1}{e^{3x}}}{e^{3x}+\dfrac{1}{e^{3x}}} = 1$$

9. $\displaystyle\lim_{x\to-\infty}\frac{e^{3x}-e^{-3x}}{e^{3x}+e^{-3x}} = \lim_{x\to-\infty}\frac{e^{3x}-\dfrac{1}{e^{3x}}}{e^{3x}+\dfrac{1}{e^{3x}}} = -1$

10. $\displaystyle\lim_{x\to(\pi/2)^-} e^{\dfrac{2}{x-1}} = e^{\dfrac{4}{\pi-2}}$ (In this case, if you ”plug-in” the number, you get a number out and you’re finished!)

11. $f'(x) = \left(e^{\sqrt{x}}\right)\left(\dfrac{1}{2\sqrt{x}}\right) = \dfrac{e^{\sqrt{x}}}{2\sqrt{x}}$

12. $$\begin{aligned}\frac{dy}{dx} &= (x)\left(2e^{2x}\right)+e^{2x}\\ &= e^{2x}(2x+1)\end{aligned}$$

13. $$\begin{aligned}h'(t) &= \frac{1}{2}\left(1-e^t\right)^{-1/2}\left(-e^t\right)\\ &= -\frac{e^t}{2\sqrt{1-e^t}}\end{aligned}$$

14. $$\begin{aligned}\frac{dy}{dx} &= e^{x\cos x}(-x\sin x+\cos x)\\ &= e^{x\cos x}(\cos x - x\sin x)\end{aligned}$$

15. $$\begin{aligned}g(x) &= e^{-x^{-1}}\\ g'(x) &= e^{-x^{-1}}(x^{-2}\\ &= \frac{e^{-1/x}}{x^2}\end{aligned}$$

16. $$\begin{aligned}\frac{dy}{dx} &= \left[\sec^2\left(e^{3x-2}\right)\right]\left(e^{3x-2}\right)(3)\\ &= 3e^{3x-2}\sec^2\left(e^{3x-2}\right)\end{aligned}$$

17. $$\begin{aligned}f'(x) &= \frac{(1+e^x)(3e^{3x})-(e^{3x})(e^x)}{(1+e^x)^2}\\ &= \frac{e^{3x}(3+2e^x)}{(1+e^x)^2}\end{aligned}$$

18. $\frac{dy}{dx} = ex^{e-1}$ (e is just a constant–standard power rule applies.)

19. First, get rid of negative exponents and get a simplified fraction.

$$\begin{aligned}y &= \frac{e^{2x}+1}{e^{2x}-1}\\ \frac{dy}{dx} &= \frac{(e^{2x}-1)(2e^{2x})-(e^{2x}+1)(2e^{2x})}{(e^{2x}-1)^2}\\ &= -\frac{4e^{2x}}{(e^{2x}-1)^2}\end{aligned}$$

20. $f'(x) = \left[\sec\left(e^{\tan x^2}\right)\tan\left(e^{\tan x^2}\right)\right]\left(e^{\tan x^2}\right)(\sec^2 x^2)(2x)$

21. Point

Given as $(\pi, 0)$.

Slope

$\frac{dy}{dx} = \left(e^{-x}\right)(\cos x) - e^{-x}\sin x \longrightarrow \left.\frac{dy}{dx}\right|_{x=\pi} = -e^{-\pi}$

Equation of tangent

$y - 0 = -e^{-\pi}(x-\pi)$

22. Point

Given as $\left(1, \frac{1}{e}\right)$

Slope

$f'(x) = (x^2)\left(-e^{-x}\right) + \left(e^{-x}\right)(2x) \longrightarrow f'(1) = \frac{1}{e}$

Equation of tangent

$y - \frac{1}{e} = \frac{1}{e}(x-1)$

23. $$[-\sin(x-y)]\left(1-\frac{dy}{dx}\right) = xe^x + e^x$$

$$-\sin(x-y) + \frac{dy}{dx}\,\sin(x-y) = xe^x + e^x$$

$$\frac{dy}{dx} = \frac{xe^x + e^x + \sin(x-y)}{\sin(x-y)}$$

24. <u>Point</u>

Given as $(0, 2)$

<u>Slope</u>

$$2e^{xy}\left(x\,\frac{dy}{dx} + y\right) = 1 + \frac{dy}{dx}$$

$$\frac{dy}{dx} = \frac{1 - 2ye^{xy}}{2xe^{xy} - 1}$$

$$\left.\frac{dy}{dx}\right|_{(0,2)} = 3$$

<u>Equation of tangent</u>

$y - 2 = 3(x - 0)$