27.6

(3) $y = 4^{6x}$

$y' = (\ln 4)\, 4^{6x}\,(6)$

$= (6 \ln 4)\, 4^{6x}$

(5) $y = 6e^{\sqrt{x}}$

$y' = 6e^{\sqrt{x}}\left(\frac{1}{2}x^{-1/2}\right)$

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

(7) $y = 4e^{t}(e^{2t} - e^{t})$

$y = 4e^{3t} - 4e^{2t}$

$y' = 4e^{3t}(3) - 4e^{2t}(2)$

$= 12e^{3t} - 8e^{2t}$

or $4e^{2t}(3e^{t} - 2)$

(9) $R = Te^{-T}$

$R' = T\left[e^{-T}(-1)\right] + e^{-T}(1)$

$= -Te^{-T} + e^{-T}$

$= e^{-T}(1-T)$

(11) $y = xe^{\sin x}$

$y' = x\left[e^{\sin x}\cos x\right] + e^{\sin x}(1)$

$= (x\cos x)e^{\sin x} + e^{\sin x}$

$= e^{\sin x}(x\cos x + 1)$

(13) $r = \dfrac{2(e^{2s} - e^{-2s})}{e^{2s}}$

$r = 2(1 - e^{-4s})$

$r' = 2(4e^{-4s})$

$= 8e^{-4s}$

(21) $y = (2e^{2x})^3 \sin x^2$

$y = 8e^{6x} \sin x^2$

$y' = 8e^{6x}[\cos x^2 (2x)] + (\sin x^2)(48e^{6x})$

$= 16xe^{6x} \cos x^2 + 48e^{6x} \sin x^2$

or $16e^{6x}[x\cos x^2 + 3\sin x^2]$

(25) $y = xe^{xy} + \sin y$

Take $\frac{d}{dx}$: $\frac{dy}{dx} = x\left[e^{xy}\left(x\frac{dy}{dx} + y(1)\right)\right] + e^{xy}(1) + \cos y \frac{dy}{dx}$

$$\frac{dy}{dx} = x\left[xe^{xy}\frac{dy}{dx} + ye^{xy}\right] + e^{xy} + \cos y \frac{dy}{dx}$$

$$\frac{dy}{dx} = x^2 e^{xy}\frac{dy}{dx} + xye^{xy} + e^{xy} + \cos y \frac{dy}{dx}$$

$$\frac{dy}{dx} - \cos y \frac{dy}{dx} - x^2 e^{xy}\frac{dy}{dx} = xye^{xy} + e^{xy}$$

$$\frac{dy}{dx}\left[1 - \cos y - x^2 e^{xy}\right] = xye^{xy} + e^{xy}$$

$$\frac{dy}{dx} = \frac{xye^{xy} + e^{xy}}{1 - \cos y - x^2 e^{xy}}$$

or $\frac{e^{xy}(xy+1)}{1 - \cos y - x^2 e^{xy}}$

(27) $y = 3e^{2x} \ln x$

$y' = 3e^{2x}\left(\frac{1}{x}\right) + (\ln x)(6e^{2x})$

$= \frac{3e^{2x}}{x} + 6e^{2x} \ln x$