7.7 Review Answers Page 344

3. a) $y = 21x^{10}$
$y' = 210x^9$

b) $y = 6\cos 3x$
$y' = -6\sin 3x \cdot 3$
$y' = -18\sin 3x$

c) $y = \frac{1}{5}\sin 20x$
$y' = \frac{1}{5}\cos 20x \cdot 20$
$y' = 4\cos 20x$

d) $y = 2e^{3x}$
$y' = 2e^{3x} \cdot 3$
$y' = 6e^{3x}$

e) $y = \ln(x^2+5x)$
$y' = \frac{1}{x^2+5x} \cdot (2x+5)$
$y' = \frac{2x+5}{x^2+5x}$

f) $y = \log_5(\sin x)$
$y' = \frac{1}{\sin x} \cdot \cos x \cdot \log_5 e$
$y' = \cot x \log_5 e$

g) $y = 10^x$
$y' = 10^x \cdot \ln 10$

h) $y = e^{\ln x^4}$
$y = x^4$
$y' = 4x^3$

i) $y = e^{-x^3}$
$y' = e^{-x^3} \cdot -3x^2$
$y' = -3x^2 e^{-x^3}$

j) $y = 5\ln 10x$
$y' = 5\left(\frac{1}{10x}\right) \cdot 10$
$y' = \frac{5}{x}$

k) $y = \cos(\ln 2x)$
$y' = -\sin(\ln 2x) \cdot \frac{1}{2x} \cdot 2$
$y' = \frac{-\sin(\ln 2x)}{x}$

l) $y = xe^{2x}$
$y' = xe^{2x} \cdot 2 + e^{2x}$
$y' = e^{2x}(2x+1)$

m) $y = x^2 \sin 2x$
$y' = x^2\cos 2x \cdot 2 + \sin 2x \cdot 2x$
$y' = 2x^2\cos 2x + 2x\sin 2x$
$y' = 2x(x\cos 2x + \sin 2x)$

n) $y = (e^x)^{20}$

$y' = 20(e^x)^{19} \cdot (e^x)'$

$y' = 20(e^x)^{20}$

o) $y = \ln(\cos 3x)$

$y' = \frac{1}{\cos 3x} \cdot \sin 3x \cdot 3$

$y' = \frac{3\sin 3x}{\cos 3x} = 3\tan 3x$

p) $y = -3\sin\left(\frac{x}{3}\right)$

$y' = -3\cos\left(\frac{x}{3}\right) \cdot \frac{1}{3}$

$y' = -\cos\frac{x}{3}$

q) $y = e^{-2\ln x}$

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

$y = x^{-2}$

$y' = -2x^{-3}$

r) $y = \frac{1}{15}(\cos x)^{30}$

$y' = 2(\cos x)^{29} \cdot (-\sin x)$

$y' = -2\sin x \cos^{29} x$

s) $y = 5^{x^3}$

$y' = 5^{x^3} \cdot 3x^2 \cdot \ln 5$

t) $y = \log e$

$y' = 0$

u) $y = \log x$

$y' = \frac{1}{x} \cdot \log e$

$y' = \frac{\log e}{x}$

v) $y = \ln\left(\frac{x}{x-1}\right)$

$y' = \frac{1}{\left(\frac{x}{x-1}\right)} \cdot \left[\frac{(x-1)(1) - x(1)}{(x-1)^2}\right]$

$y' = \frac{x-1}{x}\left[\frac{-1}{(x-1)^2}\right]$

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

w) $y = \ln[\sin(2e^{6x})]$

$y' = \frac{1}{\sin(2e^{6x})} \cdot \cos(2e^{6x}) \cdot 2e^{6x} \cdot 6$

$y' = \frac{12e^{6x}\cos(2e^{6x})}{\sin(2e^{6x})}$

$y' = 12e^{6x}\cot(2e^{6x})$

x) $y = 4(e^{3x+1})^2$

$y' = 8(e^{3x+1}) \cdot e^{3x+1} \cdot 3$

$y' = 24(e^{3x+1})^2$

16. a) $y = \tan 2x$

$y' = \sec^2 2x \cdot 2$

$y' = 2\sec^2 2x$

i) $y = -6\tan \frac{1}{2}x$

$y' = -6\sec^2\left(\frac{1}{2}x\right) \cdot \frac{1}{2}$

$y' = -3\sec^2\left(\frac{1}{2}x\right)$

m) $y = x^2 \tan \frac{1}{3}x$

$y' = x^2\left[\sec^2 \frac{1}{3}x \cdot \frac{1}{3}\right] + \tan \frac{1}{3}x \ (2x)$

$y' = \frac{x^2}{3}\sec^2\left(\frac{1}{3}x\right) + 2x\tan\left(\frac{1}{3}x\right)$

$y' = x\left[\frac{x}{3}\sec^2\left(\frac{1}{3}x\right) + 2\tan\left(\frac{1}{3}x\right)\right]$