Items from pg 118.

NOTE: I am purposely using various notations. You are free to use any valid notation (if it is correct!)

(8) $f(x) = -9 \Rightarrow \boxed{f'(x) = 0}$

(10) $y = x^{12} \rightarrow \boxed{y' = 12x^{11}}$

(12). $y = \frac{3}{x^7}$ Rewrite: $y = 3x^{-7} \Rightarrow \boxed{\frac{dy}{dx} = -21x^{-8}}$

(14). $g(x) = \sqrt[4]{x}$ Rewrite: $g(x) = x^{1/4} \Rightarrow \boxed{g'(x) = \frac{1}{4}x^{-3/4}}$

(16). $g(x) = 6x + 3 \Rightarrow \boxed{\frac{dg}{dx} = 6}$

(18). $y = t^2 - 3t + 1 \Rightarrow \boxed{y' = 2t - 3}$

(20). $y = 4x - 3x^3 \Rightarrow \boxed{\frac{dy}{dx} = 4 - 9x^2}$

(22). $y = 2x^3 + 6x^2 - 1 \Rightarrow \boxed{y' = 6x^2 + 12x}$

(24). $g(t) = \pi\cos(t) \Rightarrow \boxed{g'(t) = \pi\cdot(-\sin(t))}$

(26) $y = 7x^4 + 2\sin(x) \Rightarrow \boxed{\frac{dy}{dx} = 28x^3 + 2\cos(x)}$

(#40). $f(x) = x^3 - 2x + 3x^{-1} \Rightarrow \boxed{f'(x) = 3x^2 - 2 - 3x^{-2}}$

(#42). $f(x) = 8x + \frac{3}{x^2} \Rightarrow f(x) = 8x + 3x^{-2}$

$\Rightarrow \boxed{f'(x) = 8 + (-6x^{-3})}$

#44 $h(x) = \frac{4x^3+2x+5}{x}$

NOTE: AT THIS STAGE WE DID NOT YET HAVE THE QUOTIENT RULE. THE TECHNIQUE IS "SPLIT THE NUMERATOR"

SPLIT THE NUMERATOR

Rewrite $h(x) = \frac{4x^3}{x} + \frac{2x}{x} + \frac{5}{x}$

Rewrite $h(x) = 4x^2 + 2 + 5x^{-1}$

NOW USE POWER RULE

$\Rightarrow h'(x) = \boxed{8x + 0 - 5x^{-2}}$

NOTE: NOT NEEDED. I INCLUDED IT JUST FOR COMPLETENESS SAKE

#46. $h(s) = \frac{s^5+2s+6}{s^{1/3}}$ SAME PROCEDURE AS #44

split the numerator: $h(s) = \frac{s^5}{s^{1/3}} + \frac{2s}{s^{1/3}} + \frac{6}{s^{1/3}}$

To simplify, when you divide the bases, subtract the exponents

Rewrite

$h(s) = s^{5-1/3} + 2s^{1-\frac{1}{3}} + 6s^{-1/3}$

$= s^{14/3} + 2s^{2/3} + 6s^{-1/3}$

Now use power rule

$\Rightarrow \boxed{h'(s) = \frac{14}{3}s^{11/3} + \frac{4}{3}s^{-1/3} - 2s^{-4/3}}$

#48 $y = x^2(2x^2-3x)$ similarly, at this stage we did not have the product rule $\Rightarrow$ so multiply out (distribute)

Rewrite: $y = 2x^4 - 3x^3 \Rightarrow \boxed{y' = 8x^3 - 9x^2}$

#50 $f(t) = t^{2/3} - t^{1/3} + 4$

$\Rightarrow \boxed{f'(t) = \tfrac{2}{3}t^{-1/3} - \tfrac{1}{3}t^{-2/3} + 0}$

Note: not needed

#56 $y = x^3 - 3x$ at $(2,2)$ $\quad y - 2 = \underline{\quad\quad}(x-2)$

slope of tangent line:

$\Rightarrow y' = 3x^2 - 3$

so $y'(2) = 3(2)^2 - 3 = 12 - 3 = 9$

so $y - 2 = 9(x-2) \Rightarrow \boxed{y = 9x - 16}$

#58 $y = (x-2)(x^2+3x)$ at $(1, -4)$

Rewrite $y = x^3 - 2x^2 + 3x^2 - 6x$ $\Leftarrow$ AGAIN, AT THIS POINT WE DID NOT HAVE THE PRODUCT RULE.

$= x^3 + x^2 - 6x$

$\Rightarrow \dfrac{dy}{dx} = 3x^2 + 2x - 6$

so $\left.\dfrac{dy}{dx}\right]_{x=1} = 3(1)^2 + 2(1) - 6$

$= 3 + 2 - 6$

$= -1$

so we have $\Rightarrow y - \underline{\quad} = \underline{\quad}(x - \underline{\quad})$

$\Rightarrow y - (-4) = -1(x-1)$

$\Rightarrow y + 4 = -x + 1$

$\Rightarrow \boxed{y = -x - 3}$