3.4 Hw Solutions

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Question 1:

Solution: 😊

$$\begin{aligned} y' &= 9(6-x^3)^8 \cdot (-3x^2) \\ &= -27(6-x^3)^8. \end{aligned}$$

Question 2:

Solution: 😊

$$\begin{aligned} y' &= \sec^2 x^5 \cdot 5x^4 \\ &= 5x^4 \sec^2 x^5. \end{aligned}$$

Question 3:

Solution: 😊

$$\begin{aligned} & e^{5x^{\frac{1}{2}}} \cdot \frac{5}{2} x^{-\frac{1}{2}} \\ & \frac{5}{2} x^{-\frac{1}{2}} e^{5x^{\frac{1}{2}}} \\ &= \frac{5e^{5x^{\frac{1}{2}}}}{2x^{\frac{1}{2}}}. \end{aligned}$$

Question 4:

Solution: 😊

<u>Part 1:</u>

$$g'(x) = 6x^2 - 16x.$$

<u>Part 2:</u>

$$\begin{aligned} & 6(2x^3 - 8x^2 + 9)^5 \cdot (6x^2 - 16x) \\ &= 6(2x^3 - 8x^2 + 9)^5 \cdot 2(3x^2 - 8x) \\ &= 12(2x^3 - 8x^2 + 9)^5 \cdot (3x^2 - 8x) \end{aligned}$$

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Question 5:

Solution: 😊

$$f(x) = 1$$
$$f'(x) = 0.$$

$$g(x) = (2x^2 - 5)^{\frac{1}{3}}$$
$$g'(x) = \frac{1}{3}(2x^2 - 5)^{-\frac{2}{3}} \cdot 4x.$$

$$\begin{aligned} F'(x) &= \frac{(2x^2-5)^{\frac{1}{3}}(0) - (1)[\frac{1}{3}(2x^2-5)^{-\frac{2}{3}}(4x)]}{(2x^2-5)^{\frac{2}{3}}} \\ &= \frac{(2x^2-5)^{\frac{1}{3}}(0) - (1)[\frac{1}{3}(2x^2-5)^{-\frac{2}{3}}(4x)]}{(2x^2-5)^{\frac{2}{3}}} \\ &= \frac{-\frac{4}{3}x(2x^2-5)^{-\frac{2}{3}}}{(2x^2-5)^{\frac{2}{3}}} \\ &= \frac{-\frac{4}{3}x}{(2x^2-5)^{\frac{4}{3}}} \\ &= -\frac{4x}{3(2x^2-5)^{\frac{4}{3}}} \end{aligned}$$

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Question 6:

Solution: ☺

$$F(t) = (9t + 1)^{-5}.$$

$$\begin{aligned} F'(t) &= -5(9t+1)^{-6} \cdot 9 \\ &= -45(9t+1)^{-6} \\ &= -\frac{45}{(9t+1)^6}. \end{aligned}$$

Question 7:

Solution: ☺

<u>Move the constant outside:</u>

$$7(\cos^3\theta).$$

$$\begin{aligned} \frac{d}{d\theta} &= 7(\cos\theta)^3 \\ &= 7 \cdot 3(\cos\theta)^2 \cdot -\sin\theta \\ &-21\cos^2\theta\sin\theta. \end{aligned}$$

Question 8:

Solution: 😊

$$e^{x^4-5x}(4x^3-5).$$

Question 9:

Solution: 😊

$$f(x) = (4x+5)^3$$
$$f'(x) = 3(4x+5)^2(4).$$

$$g(x) = (x^2-8x+5)^4$$
$$g'(x) = 4(x^2-8x+5)^3(2x-8).$$

$$\begin{aligned}
F'(x) &= (4x+5)^3[4(x^2-8x+5)^3(2x-8)] + (x^2-8x+5)^4[3(4x+5)^2\cdot 4] \\
&= (4x+5)^2(x^2+8x+5)^3[4(4x+5)(2x-8) + 12(x^2-8x+5)] \\
&= (4x+5)^2(x^2+8x+5)^3[4(8x^2-22x-40) + 12x^2-96x+60] \\
&= (4x+5)^2(x^2+8x+5)^3[32x^2-88x-160+12x^2-96x+60] \\
&= (4x+5)^2(x^2+8x+5)^3[44x^2-184x-100] \\
&= (4x+5)^2(x^2+8x+5)^3[4(11x^2-46x-25)] \\
&= 4(4x+5)^2(x^2+8x+5)^3(11x^2-46x-25)
\end{aligned}$$

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Question 10:

Solution: 😊

Question 11:

Solution: 😊

Question 12:

Solution: 😊

Question 13:

Solution: 😊

Question 14:

Solution: 😊

Question 15:

Solution: 😊

Question 16:

Solution: 😊

Question 17:

Solution: 😊