1. Use the Chain Rule to differentiate: $f(x) = \dfrac{-4}{(-3+3x+x^2+2x^3)^5}$

2. Use the Chain Rule to differentiate: $f(x) = \dfrac{-5}{\sqrt[2]{3x-x^2-2x^3}}$

3. Use the Chain Rule to differentiate: $f(x) = (-3-2x+2x^2+2x^3)^{15}$

4. Use the Chain Rule to differentiate: $f(x) = \dfrac{-5}{-2+3x+3x^2+x^3}$

5. Use the Chain Rule to differentiate: $f(x) = (1+3x-x^2+x^3)^{10}$

6. Use the Chain Rule to differentiate: $f(x) = -5\sqrt[2]{(2-2x+x^2-3x^3)^{15}}$

7. Use the Chain Rule to differentiate: $f(x) = 3(2+x-x^2+3x^3)^4$

8. Use the Chain Rule to differentiate: $f(x) = 4\sqrt[2]{(3+3x+x^2+3x^3)^7}$

9. Use the Chain Rule to differentiate: $f(x) = -3(-2-2x+x^2+x^3)^2$

10. Use the Chain Rule to differentiate: $f(x) = \dfrac{-4}{\sqrt[2]{(-3+2x+x^2-x^3)^5}}$

Answers:

1. $\dfrac{20(3+2x+6x^2)}{(-3+3x+x^2+2x^3)^6}$

2. $\dfrac{5(3-2x-6x^2)}{2\sqrt[2]{(3x-x^2-2x^3)^3}}$

3. $15(-3-2x+2x^2+2x^3)^{14}(-2+4x+6x^2)$

4. $\dfrac{5(3+6x+3x^2)}{(-2+3x+3x^2+x^3)^2}$

5. $10(1+3x-x^2+x^3)^9(3-2x+3x^2)$

6. $\dfrac{-75(-2+2x-9x^2)\sqrt[2]{(2-2x+x^2-3x^3)^{13}}}{2}$

7. $12(2+x-x^2+3x^3)^3(1-2x+9x^2)$

8. $14\sqrt[2]{(3+3x+x^2+3x^3)^5}(3+2x+9x^2)$

9. $-6(-2-2x+x^2+x^3)(-2+2x+3x^2)$

10. $\dfrac{10(2+2x-3x^2)}{\sqrt[2]{(-3+2x+x^2-x^3)^7}}$

Solutions:

1. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[\frac{-4}{(-3+3x+x^2+2x^3)^5}\right]$ ▶ Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[-4(-3+3x+x^2+2x^3)^{-5}\right]$ ▶ Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (-4)(-5)(-3+3x+x^2+2x^3)^{-5-1}(3+2x+6x^2)$ ▶ Simplify:

$= 20(-3+3x+x^2+2x^3)^{-6}(3+2x+6x^2)$ ▶ Convert to radical form, if necessary:

$= \frac{20(3+2x+6x^2)}{(-3+3x+x^2+2x^3)^6}$

2. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[\frac{-5}{\sqrt[2]{3x-x^2-2x^3}}\right]$ ▶ Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[-5(3x-x^2-2x^3)^{\frac{-1}{2}}\right]$ ▶ Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (-5)\frac{-1}{2}(3x-x^2-2x^3)^{\frac{-1}{2}-1}(3-2x-6x^2)$ ▶ Simplify:

$= \frac{5}{2}(3x-x^2-2x^3)^{\frac{-3}{2}}(3-2x-6x^2)$ ▶ Convert to radical form, if necessary:

$= \frac{5(3-2x-6x^2)}{2\sqrt[2]{(3x-x^2-2x^3)^3}}$

3. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[(-3-2x+2x^2+2x^3)^{15}\right]$ ▶ Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[1(-3-2x+2x^2+2x^3)^{15}\right]$ ▶ Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (1)(15)(-3-2x+2x^2+2x^3)^{15-1}(-2+4x+6x^2)$ ▶ Simplify:

$= 15(-3-2x+2x^2+2x^3)^{14}(-2+4x+6x^2)$ ▶ Convert to radical form, if necessary:

$= 15(-3-2x+2x^2+2x^3)^{14}(-2+4x+6x^2)$

4. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[\frac{-5}{-2+3x+3x^2+x^3}\right]$ ▶ Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[-5(-2+3x+3x^2+x^3)^{-1}\right]$ ▶ Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (-5)(-1)(-2+3x+3x^2+x^3)^{-1-1}(3+6x+3x^2)$ ▶ Simplify:

$= 5(-2+3x+3x^2+x^3)^{-2}(3+6x+3x^2)$ ▶ Convert to radical form, if necessary:

$= \frac{5(3+6x+3x^2)}{(-2+3x+3x^2+x^3)^2}$

5. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[(1+3x-x^2+x^3)^{10}\right]$ ▶ Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[1(1+3x-x^2+x^3)^{10}\right]$ ▶ Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (1)(10)(1+3x-x^2+x^3)^{10-1}(3-2x+3x^2)$ ▶ Simplify:

$= 10(1+3x-x^2+x^3)^9(3-2x+3x^2)$ ▶ Convert to radical form, if necessary:

$= 10(1+3x-x^2+x^3)^9(3-2x+3x^2)$

6. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[-5\sqrt[2]{(2-2x+x^2-3x^3)^{15}}\right]$ ▶ Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[-5(2-2x+x^2-3x^3)^{\frac{15}{2}}\right]$ ► Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (-5)\frac{15}{2}(2-2x+x^2-3x^3)^{\frac{15}{2}-1}(-2+2x-9x^2)$ ► Simplify:

$= \frac{-75}{2}(2-2x+x^2-3x^3)^{\frac{13}{2}}(-2+2x-9x^2)$ ► Convert to radical form, if necessary:

$= \frac{-75(-2+2x-9x^2)\sqrt[2]{(2-2x+x^2-3x^3)^{13}}}{2}$

7. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[3(2+x-x^2+3x^3)^4\right]$ ► Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[3(2+x-x^2+3x^3)^4\right]$ ► Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (3)(4)(2+x-x^2+3x^3)^{4-1}(1-2x+9x^2)$ ► Simplify:

$= 12(2+x-x^2+3x^3)^3(1-2x+9x^2)$ ► Convert to radical form, if necessary:

$= 12(2+x-x^2+3x^3)^3(1-2x+9x^2)$

8. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[4\sqrt[2]{(3+3x+x^2+3x^3)^7}\right]$ ► Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[4(3+3x+x^2+3x^3)^{\frac{7}{2}}\right]$ ► Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (4)\frac{7}{2}(3+3x+x^2+3x^3)^{\frac{7}{2}-1}(3+2x+9x^2)$ ► Simplify:

$= \frac{14}{1}(3+3x+x^2+3x^3)^{\frac{5}{2}}(3+2x+9x^2)$ ► Convert to radical form, if necessary:

$= 14\sqrt[2]{(3+3x+x^2+3x^3)^5}(3+2x+9x^2)$

9. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[-3(-2-2x+x^2+x^3)^2\right]$ ► Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[-3(-2-2x+x^2+x^3)^2\right]$ ► Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (-3)(2)(-2-2x+x^2+x^3)^{2-1}(-2+2x+3x^2)$ ► Simplify:

$= -6(-2-2x+x^2+x^3)^1(-2+2x+3x^2)$ ► Convert to radical form, if necessary:

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

10. $f'(x) = \frac{\mathrm{d}}{\mathrm{d}x}\left[\frac{-4}{\sqrt[2]{(-3+2x+x^2-x^3)^5}}\right]$ ► Convert to exponential form:

$= \frac{\mathrm{d}}{\mathrm{d}x}\left[-4(-3+2x+x^2-x^3)^{\frac{-5}{2}}\right]$ ► Apply the Chain Rule: $\frac{\mathrm{d}}{\mathrm{d}x}[f(x)]^n = n[f(x)]^{n-1}\frac{\mathrm{d}}{\mathrm{d}x}f(x)$

$= (-4)\frac{-5}{2}(-3+2x+x^2-x^3)^{\frac{-5}{2}-1}(2+2x-3x^2)$ ► Simplify:

$= \frac{10}{1}(-3+2x+x^2-x^3)^{\frac{-7}{2}}(2+2x-3x^2)$ ► Convert to radical form, if necessary:

$= \frac{10(2+2x-3x^2)}{\sqrt[2]{(-3+2x+x^2-x^3)^7}}$