1. Find the derivative, $y'$ if
   a. $y = x^{-4} + x^{1/2} - e^3$.
   b. $y = \frac{1}{\sqrt{x^2}}$.
   c. $y = 4.2x^2 - \frac{0.5}{\sqrt{x}} + 2$.
   d. $y = x^3 - 1.5x - 10\sqrt{x}$.
   e. $y = \frac{x^5 - 5x - 2}{x^2}$.

   
   \[
   d\quad y = x^2 - \frac{3x}{2} - \frac{10\sqrt{x}}{2}
   \]
   
   \[
   y' = 2x - \frac{3}{2} - \frac{5}{2}\sqrt{x}
   \]

   \[
   y' = 2x - \frac{3}{2} - \frac{5}{x^{1/2}}
   \]

   e. $y = \frac{x^5 - 5x - 2}{x^2}$

   \[
   y = \frac{x^5}{x^2} - \frac{5x^3}{x^2} - \frac{2}{x^2}
   \]

   \[
   y = x^3 - 5x - 2x^{-2}
   \]

   \[
   y' = 3x^2 - 5 + 4x^{-3}
   \]

   \[
   y' = 3x^2 - 5 + \frac{4}{x^3}
   \]

   a. $y = x + x^{3/2} - e^3$

   \[
   y' = -4x^{-5} + \frac{3}{2}x^{1/2} + 0
   \]

   \[
   y' = -4x^{-5} + \frac{3}{2}x^{1/2}
   \]

   b. $y = \frac{1}{3x^2} = x^{-2/3}$

   \[
   y' = -\frac{2}{3}x^{-5/3} = -\frac{2}{3x^{5/3}}
   \]

   c. $y = 4.2x^{-2} - 0.5x^{1/4} + 2$

   \[
   y = 4.2x^{-3} - 0.5x^{-1/4} + 2
   \]

   \[
   y' = -8.4x^{-4} + \frac{1}{8}x^{-3/4}
   \]

2. How can the derivative be used to find the maximum and minimum?

   The max/min occurs where the tangent line has a slope of 0.
   Set $y' = 0$ and solve for $x$. 
3. The price-demand function and the cost function for the production of air-conditioning units is \( x = 2000 - 0.25p \) and \( C(x) = 60,000 + 200x \).

a. Find the average cost of making 100 units.

b. Find the marginal cost of making 100 units.

c. Find the marginal average cost when \( x = 100 \).

d. Find the revenue when 100 units are made and sold.

e. Find the average revenue when 100 units are made and sold.

f. Find the revenue of making and selling 25 units.

g. Find the approximate revenue from the 25th unit.

h. Find the marginal average revenue function.

i. What is the profit from making and selling 100 units?

j. What is the marginal profit function.

k. Find the marginal average cost function.

l. How many should they make and sell to maximize revenue?

m. How many should they make and sell to maximize profit?

d. \( R = x \rho \)

\[ R = x(8000 - 4x) \]

\[ R = 8000x - 4x^2 \]

e. \( AR = 8000 - 4x \quad AR = \frac{R}{x} \]

\[ AR_{(100)} = 8000 - 4(100) = 7600 \]

f. \( R'(25) = 8000(25) - 4(25)^2 = 197,500 \]

g. \[ R'(24) = 8000 - 8(24) = 7808 \]
The price-demand function and the cost function for the production of air-conditioning units is \( x = 2000 - 0.25p \) and \( C(x) = 60,000 + 200x \).

h. Find the marginal average revenue function.

i. What is the profit from making and selling 100 units?

j. What is the marginal profit function.

k. Find the marginal average cost function.

l. How many should they make and sell to maximize revenue?

m. How many should they make and sell to maximize profit?

\[
\begin{align*}
l. \quad R &= 8000x - 4x^2 \\
AR &= 8000 - 4x \\
\text{MAR} &= -4 \\
m. \quad P &= 8000x - 4x^2 - 60,000 \\
P &= 8000x - 4x^2 - 60,000 - 200x \\
P &= 7800x - 4x^2 - 60,000 \\
MP &= P' = 7800 - 8x \\
\text{AC} &= \frac{60,000}{x} + 200x = 60,000 + 200x \\
\text{MAC} &= -60,000x^{-2} + 0 = -\frac{60,000}{x^2}
\end{align*}
\]
4. Find the derivative of \( f(x) = e^x - 4 \ln x + 10 \)

\[
f' = e^x - 4 \cdot \frac{1}{x} + 0
\]

5. Find \( y' \) when \( y = 4^x - 5 \log_2 x \)

\[
y' = 4^x \ln 4 - 5 \cdot \frac{1}{x \ln 2}
\]

6. Find \( \frac{dy}{dx} \) when \( y = \ln(x \cdot e^x) \)

\[
y = \ln x + \ln e^x
\]

\[
y = \ln x + x
\]

\[
\frac{dy}{dx} = \frac{1}{x} + 1
\]

7. Find the equation of the tangent to the curve \( f(x) = e^x + 2 \) at \( x = 0 \).

\[
f(x) = e^x + 2
\]

\[
f(0) = e^0 + 2 = 3
\]

\[
m = f'(0) = e^0 = 1
\]

\[
y - y_1 = m(x - x_1)
\]

\[
y - 3 = 1(x - 0)
\]

\[
y - 3 = x
\]

\[
y = x + 3
\]
8. A mathematical model for the average grade on exam 2, of a group of students learning their derivative rules is given by $f(x) = 52 \ln x - .001e^x$ on the domain is $(0, 7)$. $x$ represents the number of hours spent each week on calculus, and $f(x)$ represents the students average grade.

a. For the student who studies 4 hrs each week, what would this model predict their score would be?

\[ f(4) = 52 \ln 4 - 0.001e^4 \approx 72\% \]

b. What is the expected improvement in your grade if you were studying 4 hr/wk and you increase that 1 hr each week?

\[ f'(x) = 52 \cdot \frac{1}{x} - 0.001e^x \]

\[ f'(4) = 52 \cdot \frac{1}{4} - 0.001e^4 \approx 13\% \]
9. \( g(x) = (x^6 + 2x - 5)(x^{1/2} - 7x^{-2} + 6) \), find the derivative.

\[
g'(x) = (x^{3/2} + 2x - 5)(\frac{1}{2}x^{-1/2} + 14x^{-3} + 0) +
\quad (x^{1/2} - 7x^{-2} + 6)(\frac{2}{3}x^{-1/3} + 2 + 0)
\]

\[
g' = \frac{1}{2} x^6 \cdot 14 + x^{1/2} + 28x^{-2} - \frac{5}{2}x^{-2} - 70x^{-3} +
\quad \frac{2}{3} x^{3/2} + 2x^{1/2} - 14x^{-3} - 14x^{-2} + 4x + 12
\]

\[
g' = \frac{7}{6} x^{5/6} + \frac{28}{3} x^{1/3} + 3x^{1/2} + 14x^{-2} - \frac{5}{2} x^{1/2} + 4x^{-3} - 70x^{-3} + 12
\]

10. \( h(x) = \frac{2x^3 - 1}{x^2 + 3} \), find \( h'(x) \).

\[
h' = \frac{(x^2 + 3)(6x^2) - (2x^3)(2x)}{(x^2 + 3)^2}
\]

\[
h' = \frac{6x^4 + 18x^2 - 4x^4 + 2x}{(x^2 + 3)^2}
\]

\[
h' = \frac{2x^4 + 18x^2 + 2x}{(x^2 + 3)^2}
\]

11. Given \( f(w) = \frac{5\sqrt{w}}{w - 2} \), find \( \frac{df}{dw} \).

\[
f = \frac{5w^{1/3}}{w - 2}
\]

\[
f' = \frac{(w - 2)(\frac{5}{3}w^{-2/3}) - (5w^{1/3})(1)}{(w - 2)^2}
\]

\[
f' = \left[ \frac{\frac{5}{3}w^{1/3} - \frac{10}{3}w^{-2/3} - 5w^{1/3}}{(w - 2)^2} \right] \cdot \frac{3w^{1/3}}{3w^{1/3} \cdot (w - 2)^2}
\]

\[
f'' = \frac{5w - 10 - 15w}{3w^{3/2} \cdot \left( w - 2 \right)^2} = \frac{-10w - 10}{3w^{3/2} \cdot \left( w - 2 \right)^2}
\]
12. Find \( y' \) when \( y = \frac{\log(x^4)}{\sqrt{x} + \sqrt[3]{x^2}} \). 

\[
y' = \left(\frac{1}{x^{\frac{1}{2}} + x^{\frac{2}{3}}} \right) \cdot 4 \cdot \frac{1}{x \ln 10} - 4 \log x \left(\frac{\frac{1}{2}x^{-\frac{1}{2}} + \frac{2}{3}x^{-\frac{1}{3}}}{x^{\frac{1}{2}} + x^{\frac{2}{3}}}\right)
\]

13. Find the derivative of \( f(x) = 8^x \left(\frac{x^{\frac{1}{2}}}{\sqrt[3]{x^3}}\right) \).

\[
f(x) = 8^x \cdot \sqrt[15]{x}
\]

\[
f'(x) = 8^x \left(\frac{11}{15}x^{-\frac{4}{15}}\right) + x^{\frac{11}{15}} \cdot 8 \ln 8
\]

14. \( f(x) = (x^3 + 1)^6 \) Find \( f'(x) \).

\[
f'(x) = 5(x^2+1)^4 (2x)
\]

\[
f'(x) = 10x(x^2+1)^4
\]

15. Find the values of \( x \) where the tangent line is horizontal for \( f(x) = \frac{x^3}{(1-x)^5} \).

\[
f' = \frac{(4-x)^5 (3x^2) - x^3 (5)(4-x)(-1)}{(4-x)^5} = 0
\]

\[
3x^2 (4-x)^5 + 5x^3 (4-x)^4 = 0
\]

\[
x^2 (4-x) (3(4-x) + 5x) = 0
\]

\[
x^2 (4-x)^4 (12+2x) = 0
\]

\[
x = 0 \quad x = 4 \quad x = -6
\]
16. \( f(x) = e^{4x^2 - 5x + 2} \) Find \( f'(x) \).

\[
f'(x) = e^{4x^2 - 5x + 2} (8x - 5)
\]

\[
f'(x) = (8x - 5) e^{4x^2 - 5x + 2}
\]

17. \( f(x) = \sqrt{x^4 + 1} \cdot e^{x^2 + 1} \) Find \( f'(x) \).

\[
f(x) = (x^4 + 1)^{\frac{1}{2}} \cdot e^{x^2 + 1}
\]

\[
f'(x) = \frac{1}{2} (x^4 + 1)^{-\frac{1}{2}} \cdot x^4 \cdot e^{x^2 + 1} + (x^4 + 1)^{\frac{1}{2}} \cdot 2x \cdot e^{x^2 + 1} + \frac{1}{2} (x^4 + 1)^{\frac{1}{2}} \cdot e^{x^2 + 1} 
\]

\[
f'(x) = 2x (x^4 + 1)^{\frac{1}{2}} e^{x^2 + 1} + 2x^3 e^{x^2 + 1} + \frac{1}{2} (x^4 + 1)^{\frac{1}{2}} e^{x^2 + 1}
\]

\[
f'(x) = \frac{2x (x^4 + 1)^{\frac{1}{2}} e^{x^2 + 1}}{(x^4 + 1)^{\frac{1}{2}}}
\]

18. The cost function for Littleton Little League is modeled by \( C(x) = \ln(3x^2 + 4x + 10) \). Find \( C''(20) \) and interpret. \( x \) represents the number of players in the league, and \( C(x) \) represents the cost in hundreds of dollars.

\[
C = \ln(3x^2 + 4x + 10)
\]

\[
C'(x) = \frac{6x + 4}{3x^2 + 4x + 10}
\]

\[
C''(20) = \frac{6(20) + 4}{3(20)^2 + 4(20) + 10} = \frac{124}{1290} \approx 0.096124
\]

\[
C'(20) \text{ approximates the cost to add } 1 \text{ more player to the team} \approx $9.61
\]
19. Given \( R(x) = 4x^2 - \frac{1}{2}x + 8 \), find the marginal average revenue.

\[
R_a = 4x - \frac{1}{2} + \frac{8}{x} = 4x - \frac{1}{2} + 8x^{-1}
\]
\[
AR_a = 4 + 0 - 8x^{-2}
\]
\[
MAR_a = 4 - 8x^{-2} = \frac{4 - 8}{x^2}
\]

20. Given \( C(x) = 250 - 5x \), find the average cost for \( x = 8 \).

\[
AC = \frac{250}{x} - 5
\]

\[
AC(8) = \frac{250}{8} - 5 = 26.25
\]

21. Solar Energy INC, creates sidewalk lanterns which run on solar energy. They have determined a price demand function for their product of \( x = 2500 - 100p \). They have fixed costs of $504, and variable costs of $12 per item.

a) Find the domain of the price-demand function, \( p(x) \).

b) Find the cost function, \( C(x) \).

c) Find \( R(x) \), the revenue function in terms of the quantity produced and find its domain.

d) Find the quantity they should produce and sell to maximize profit.

\[
\alpha \cdot x = 2500 - 100p
\]

\[
100p = 2500 - x
\]

\[
p = 25 - 0.01x
\]

\[
p(x) = 25 - 0.01x
\]

\[
p > 0
\]

\[
\text{domain } x < 2500
\]

b. \( C = f + vx \)

\[
C = 504 + 12x
\]

c. \( R = xp = x(25 - 0.01x) \)

\[
R = 25x - 0.01x^2
\]

d. \( p = 25x - 0.01x^2 - (504 + 12x) \)

\[
p = 13x - 0.01x^2 - 504
\]

\[
p' = 13 - 0.02x = 0
\]

\[
13 = 0.02x
\]

\[
650 = x
\]
Find the derivative of each of the following:

22. \( f(x) = 2x^3 - \frac{4}{x^2} + 10x\sqrt{x} + e^2 \)
\[ f'(x) = 6x^2 - 8x^{-3} + 5x^{-\frac{1}{2}} + 2 \]
\[ \frac{d}{dx} \left( \sqrt{x} \right) = \frac{2}{2x} + \frac{8}{x^3} + \frac{5}{\sqrt{x}} \]

23. \( g(x) = \ln x - x^2 + 5x \)
\[ g'(x) = \frac{1}{x} - 2x + 5 \]

24. \( h(x) = e^x \cdot (x^2 + 4) \)
\[ h'(x) = e^x \cdot (2x + (x^2 + 4)) \]
\[ h'(x) = e^x \cdot (x^2 + 2x + 4) \]

25. \( f(x) = \frac{x^e}{x^2 + 1} \)
\[ f'(x) = \frac{(x^e)\left( x^2 + 1 \right) - x^{e-1} \cdot 2x}{(x^2 + 1)^2} = \frac{x^{e-2} \left( 2x - x^2 + 1 \right)}{(x^2 + 1)^2} \]

26. \( g(x) = \ln \ln(x^2 + 1) \)
\[ g'(x) = \frac{2x}{(x^2 + 1) \ln(x^2 + 1)} \]

27. \( h(x) = \log x^2 \)
\[ h'(x) = \frac{2x}{x^2 \ln 10} = \frac{2}{x \ln 10} \]

28. \( f(x) = x^x \)
\[ y = x^x \]
\[ \ln y = \ln(x^x) \]
\[ \ln y = x \cdot \ln x \]
\[ \frac{y'}{y} = x \cdot \ln x + \left( \ln x \right)' \]
\[ \frac{y'}{y} = x \cdot \ln x + \frac{1}{x} \]
\[ y' = y \left[ 1 + \ln x \right] \]

**Take the derivative of each side with respect to \( x \):**
\[ y' = x^x \left( 1 + \ln x \right) \]
Find the second derivative of each of the following:

29. \( y = e^{x(x^2)} \)
\[
y' = e^{x(2x)} + x^2(e^x) = e^x(2x + x^2)
\]
\[
y'' = e^x(2 + 2x) + (2x + x^2)e^x
\]
\[
y'' = e^x(x^2 + 4x + 2)
\]

30. \( y = \ln(x^2 - 1) \)
\[
y' = \frac{2x}{x^2 - 1}
\]

31. The cost function for Rapid Rentals is given by \( C(x) = 120 + 50x^2 \), where \( x \) is the number of units rented in hundreds, and \( C(x) \) is measured in dollars.

a. What is the average change in cost when the rentals increase from 200 to 350?

\[
x = 2 \quad \Rightarrow \quad x = 3.5
\]
\[
C(2) = 320
\]
\[
C(3.5) = 732.5
\]
\[
m = \frac{732.5 - 320}{3.5 - 2} = \frac{412.5}{1.5} = 275
\]

b. Find the marginal average cost for 1,000 rentals.
\[
C = 120 + 50x^2
\]
\[
AC = \frac{120 + 50x}{x} = 120x^{-1} + 50x
\]
\[
MAC = -120x^{-2} + 50 = -\frac{120}{x^2} + 50
\]

1,000 rentals \( \Rightarrow x = 10 \)
\[
MAC(10) = -1.2 + 50 = 48.80
\]
Find the account balance if $5000 is deposited in a CD which pays \( 4 \frac{1}{4}\% \) compounded continuously, in 12 years.

How long before the balance reaches $12,000?

\[ A = Pe^{rt} \]
\[ A = 5000e^{0.0425 \cdot 12} = \boxed{8326.46} \]

\[ 12000 = 5000e^{0.0425t} \]
\[ 2.4 = e^{0.0425t} \]
\[ \ln 2.4 = 0.0425t \]
\[ t = \frac{\ln 2.4}{0.0425} \sim \boxed{20.6 \text{ yrs}} \]

34. Approximate the revenue from the sale of the 5th item when the price-demand function is given by \( 5x + 2p = 80 \).

\[ 2p = 80 - 5x \]
\[ p = 40 - 2.5x \]
\[ R = xp \]
\[ R = x(40 - 2.5x) \]
\[ R = 40x - 2.5x^2 \]
\[ R'(4) = 40 - 5x \]
\[ R'(4) = 40 - 5(4) = \boxed{20} \]

35. Find the derivative of
\[ y = \ln \left[ (x^2 + 1)^3 \cdot \sqrt{8x - 10} \right]. \]

\[ y = \ln (x^2 + 1)^3 + \ln (8x - 10)^{\frac{1}{2}} \]
\[ y = 3 \ln (x^2 + 1) + \frac{1}{2} \ln (8x - 10) \]
\[ y' = 3 \cdot \frac{2x}{x^2 + 1} + \frac{1}{2} \cdot \frac{8}{8x - 10} = \frac{6x}{x^2 + 1} + \frac{4}{8x - 10} \]

36. Find the derivative or \( y = \frac{e^x - e^{-2x}}{e^{2x} + e^{-2x}} \).

\[ y' = (e^x + e^{-2x})(2e + 2e^{-2x}) - (e^x - e^{-2x})(2e + 2e^{-2x}) \]
\[ (e^{2x} + e^{-2x})^2 \]
\[ y' = \frac{4e^x + 2e + 2e + 2e}{4x} - \frac{4e^x - 2e - 2e + 2e}{4x} \]
\[ (e^{2x} + e^{-2x})^2 \]
\[ y' = \frac{8}{(e^{2x} + e^{-2x})^2} \]
37. Find \( \frac{du}{dx} \) if \( y = 8\sqrt{u} \) and \( u = \ln x \) at \( x = e^4 \).

\[
\begin{align*}
y & = 8u^{1/2} \\
dy & = 4u^{-1/2} \\
du & = \frac{1}{x} \\
dy \\
du \\
dx & = 4u^{-1/2} \cdot \frac{1}{x} \\
dx & = 4(\ln x)^{1/2} \cdot \frac{1}{x} = \frac{4}{x\sqrt{\ln x}} \\
dx \\
\end{align*}
\]

38. a. Given the price \( p \) of an item is given by \( p = \frac{1}{5}x + 20 \), find the elasticity of demand at \( p = $4 \).

b. Should the price be raised, lowered, or stay the same?

c. If the price changes by 50%, how will the demand change?

\[
\begin{align*}
p & = \frac{1}{5}x + 20 \\
p & = -x + 100 \\
x & = 100 - 5p \\
f(p) & = 100 - 5p \\
f'(p) & = -5 \\
E(p) & = \frac{-p \cdot f'(p)}{f(p)} \\
E(p) & = -p \cdot \frac{-5}{100 - 5p} \\
E(p) & = \frac{5p}{100 - 5p} \\
E(p) & = \frac{-5}{20 - p} \\
\end{align*}
\]

39. Find the interval(s) where \( f(x) \) is increasing when \( f(x) = e^{-x} \cdot (x^2 - 6x + 1) \).

\[
\begin{align*}
f' & = e^{-x}(2x-6)+ (x-6x+1)(-e^{-x}) \\
f' & = e^{-x}(2x-6-x^2 + 6x-1) \\
f' & = e^{-x}(8x-7-x^2) = 0 \\
\end{align*}
\]

\[
\begin{align*}
e^{-x} & = 0 \quad -x^2 + 8x - 7 = 0 \\
x & = \frac{-8 \pm \sqrt{64 - 4 \cdot 7}}{2} \\
x & = \frac{-8 \pm \sqrt{36}}{2} \\
x & = \frac{-8 \pm 6}{2} \\
x & = 7 \text{ or } x = -1 \\
\end{align*}
\]

Test \( 0 \), \( 2 \), and \( 10 \) to find the intervals where \( f' \) is negative.

\[
\begin{align*}
f' & = e^{-x}(-1)(x-7)(x-1) \\
\end{align*}
\]
40. Find the equation of the tangent to
\[ y = \frac{\ln(x + 1)}{e^x + 1} \] at \( x = 0 \).

41. Given the graph below of \( f'(x) \), find the value of \( x \) where \( f(x) \) has a local minimum.
42. Sketch the graph of a function $f$ that satisfies the following:

Domain: $(-\infty, 4) \cup (4, \infty)$
Vertical asymptotes: $x = 4$
Horizontal asymptote: $y = -2$
$x$-intercepts: $(6, 0)$
$y$-intercept: $(0, -3)$

43. Sketch the graph of a function $f$ that satisfies the following:

Domain: All real numbers where $x \neq -3$
$x$-intercepts: $(-2, 0)$ and $(2, 0)$; $y$-intercept: $(0, 4)$
Vertical asymptotes: none
$$\lim_{x \to -\infty} f(x) = \infty \quad \text{and} \quad \lim_{x \to \infty} f(x) = 0$$
$f'(x) > 0$ on $(-2, 0) \cup (4, \infty)$
$f'(x) < 0$ on $(-\infty, -3), (-3, -2) \cup (0, 4)$
$f''(x) > 0$ on $(-\infty, -3) \cup (-3, -1) \cup (1, 6)$
$f''(x) < 0$ on $(-1, 1) \cup (6, \infty)$
44. Find the absolute extrema (locations and values) of \( f(x) = x^2e^{-0.1x} \) on
   a. \([-5, 30]\]
   b. \([-4, 8]\]

45. Find all local extrema of each of the given functions on its domain. Use the Second Derivative Test when it applies.
   a. \( f(x) = x^4 - 4x^3 - 80x^2 - 120 \)
   b. \( g(x) = -0.2x + \ln(5x - 20) \)
   c. \( h(x) = 2x^5 - 15x^4 - 90x^3 + 75 \)
46. Each of the following functions has one absolute extremum on the provided interval. Find the location and value of the absolute extremum and classify it as an absolute maximum or absolute minimum.

\[ f(x) = \frac{2x}{e^{0.5x}} \text{ on the interval } (0, \infty) \]

47. \[ g(x) = -2x \ln x + 4x \text{ on the interval } (0, \infty) \]

48. \[ h(x) = 10 - 2x - \frac{12}{x^2} \text{ on the interval } (0, \infty) \]
49. Marcia wants to build 4 dog runs to raise shelties with 1600 feet of fencing. What dimensions will maximize the total area of the space for her dogs?

50. Marcia decided to instead fence in a rectangular area of 32,550 ft² in her back yard. She would like for the fence to extend the same distance to the left and right of the back side of her house, which is 80 feet wide. Material for the sides of the fence that extend on each side of the back side of the house costs $50 per linear foot, and material for the other three sides costs $25 per linear foot. Find the dimensions of the fenced area that minimizes cost.
51. *Inventory Control* - Nan’s Grand Pianos sell 480 grand pianos during the year. Their supplier charges Nan $2600 for each piano, plus a shipping and handling charge of $675 for each order placed. The Warehouse Around The Corner charges Nan $720 to store a piano for a year. Let \( x \) represent the number of pianos ordered each time.

a. Find the expression which represents the cost of one order.

b. Find the expression for the storage costs.

c. Find the function, \( C_I \), which represents the inventory costs.

d. How many pianos should Nan order at one time to minimize inventory costs?
52. Apply the graphing strategy to sketch the graph of \( f(x) = \frac{3x^2 - 10x + 8}{x^2 - 4} \).

53. Find **ALL** asymptotes for each of the following functions:

a. \( f(x) = \frac{2x^2 - 5x + 10}{x - 1} \)

b. \( g(x) = \frac{5x^2 - 14x - 3}{2x^2 - 18} \)

c. \( h(x) = 4x + 5 - \frac{2x}{x^2 - 10} \)

d. \( F(x) = \frac{4x^3 - 6x^2 + 2}{x^2 + 4} \)