Math142 Week In Review # 7

The Most Important Problems to Understand - This Week

A. Find the derivative of each of the following:

1. $f(x) = 2x^3 - \dfrac{4}{x^2} + 10\sqrt{x} + e^2$

2. $g(x) = \ln\ x - e^x + 5x$

3. $h(x) = e^x\left(x^2 + 4\right)$

4. $f(x) = \dfrac{e^x}{x^2 + 1}$

5. $g(x) = \ln(\ln(x^2 + 1)$

6. $h(x) = \log\ x^2$

7. $f(x) = x^x$

B. Find the second derivative of each of the following:

8. $y = e^x(x^2)$

9. $y = \ln\left(x^2 - 1\right)$

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.

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

11. Find the marginal average cost for $1,000$ rentals.

12. a. Find the account balance if \$5000 is deposited in a CD which pays $4\frac{1}{4}\%$ compounded continuously, in 12 years.

    b. How long before the balance reaches $\$12,000$?

13. Approximate the revenue from the sale of the 5^{th} item when the price-demand function is given by $5x + 2p = 80$.

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

15. Find the derivative or $y = \dfrac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}}$.

16. Find $\dfrac{dy}{dx}$ if $y = 8\sqrt{u}$ and $u = \ln\ x$ at $x = e^4$.

17. Given the price p of an item is given by $p = -\dfrac{1}{5}x + 20$, find the elasticity of demand at $p = \$4$.

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

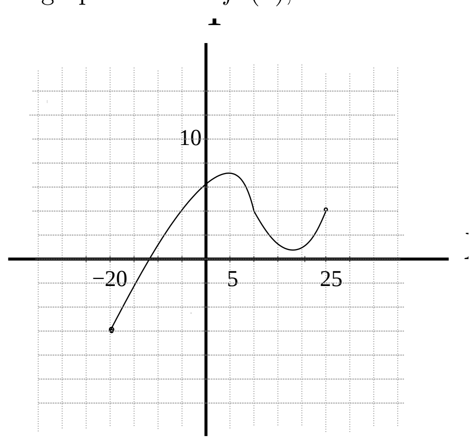
c. If the price changes by 50%, how will the demand change?

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

19. Find the equation of the tangent to

$$y = \frac{\ln(x+1)}{e^x + 1} \text{ at } x = 0.$$

20. Given the graph below of $f'(x)$, find the value of x where $f(x)$ has a local minimum.



Answers

1. $f'(x) = 6x^2 + \dfrac{8}{x^3} + \dfrac{5}{\sqrt{x}}$
2. $g'(x) = \dfrac{1}{x} - e^x + 5$
3. $h'(x) = e^x(x^2 + 2x + 4)$
4. $f'(x) = \dfrac{e^x(x-1)^2}{(x^2+1)^2}$
5. $g'(x) = \dfrac{2x}{x^2+1} \cdot \dfrac{1}{\ln\,(x^2+1)}$
6. $h'(x) = \dfrac{2}{x \ln 10}$
7. $f'(x) = x^x(1 + \ln\ x)$
8. $y''(x) = e^x\ [x^2 + 4x + 2\ ]$
9. $y''(x) = \dfrac{-2(x^2+1)}{(x^2-1)^2}$
10. \$275
11. \$48.80
12. a. \$8326.46, b. approx. 20.6 years
13. \$20
14. $y' = \dfrac{3(2x)}{x^2+1} + \dfrac{1}{x} \cdot \dfrac{8}{8x-10}$
15. $y'(x) = \dfrac{8}{(e^{2x} + e^{-2x})^2}$
16. $\dfrac{dy}{dx} = \dfrac{2}{e^4}$
17. a. $E(4) = 0.25$, b. The price should be raised., c. The price increases 50%, then the demand will decrease $12\frac{1}{2}$%.
18. increasing $(1, 7)$
19. $y = \frac{1}{2}x$
20. $x = 12$ approximately