

Solution to Review Questions

MAT1320, Fall 2015

1. $3/2$.

2. $x = \frac{\ln 2 + \ln 3}{2 \ln 2 - \ln 3} = \frac{\ln 6}{\ln(4/3)}$.

3. $x = \frac{10e^{-3}}{1 + e^{-3}}$.

4. (a) -0.3 . (b) $\frac{\pi}{3}$. (c) $\frac{\pi}{3}$. (d) $\frac{a}{\sqrt{1+a^2}}$.

5. (a) $-\frac{4}{3}$. (b) $\frac{1}{6}$. (c) $\frac{1}{\sqrt{2}}$. (d) $-\frac{1}{2}$.

6. $a = -4, b = 15$.

7. $y' = 2x \cos(x^2) e^{\sin(x^2)}$.

8.

x	1	2	3	4	5
$g(x)$	4	1	3	2	5
$g'(x)$	0.6	-0.05	0.4	-0.12	0.4

9. $y' = \frac{1}{\sqrt{2x-1}}$.

10. $y' = \frac{1}{\sqrt{x^2+4}}, y'' = -\frac{x}{(x^2+4)^{3/2}}$.

11. $y^{(73)} = -\sin x$.

12. $y' = 7/8$.

13. $y' = \frac{(x^4+1)^{2/3} e^{x^2}}{\sqrt{x^2+1}} \left(\frac{8x^3}{3(x^4+1)} + 2x - \frac{x}{x^2+1} \right)$.

14. $y' = (\sin x)^{\sin x} \cos x (\ln \sin x + 1)$.

15. $6 / 13 \text{ m / sec.}$

16. $1.4 \text{ cm}^2 / \text{min.}$

17. $y = \frac{5}{27} (x - 4) + 3 \cdot \frac{79}{27}.$

18. $\pi.$

19. $7.$

20. $L_6 = 2.180, R_6 = 2.220, T_6 = 2.200, S_6 = 2.227.$

21. $M_6 = 1.471.$

22. $\frac{2128}{3}$ meters.

23. $F'(x) = 3x^2(2x^6 + 1)^{1/3} - 2x(2x^4 + 1)^{1/3}.$

24. $\frac{52}{5}$

25. $\frac{5}{3}.$

26. $\frac{1}{3}x^3 \arctan x - \frac{1}{6}x^2 - \frac{1}{6}\ln(1+x^2) + C.$

27. $\frac{4}{3}.$

28. $-\frac{1}{12}\ln|3x+1| + \frac{3}{4}\ln|x-1| + C.$

29. $\frac{1}{2}\ln(x^2 + 2x + 5) + \frac{1}{2}\arctan\left(\frac{x+1}{2}\right) + C.$

30. $\frac{1}{5}\ln|x| - \frac{1}{10}\ln(x^2 + 2x + 5) - \frac{1}{10}\arctan\left(\frac{x+1}{2}\right) + C$

31. $\frac{x}{\sqrt{1-x^2}} + C.$

32. (a) $y' = -\frac{4x-1}{5x^{4/5}(x+1)^2}$, $y'' = \frac{2(18x^2-9x-2)}{25x^{9/5}(x+1)^3}$.

(b) $x = 0$, $x = 1/4$.

(c) The function is increasing when $x < -1$ or $-1 < x < 1/4$, and it is decreasing when $x > 1/4$.

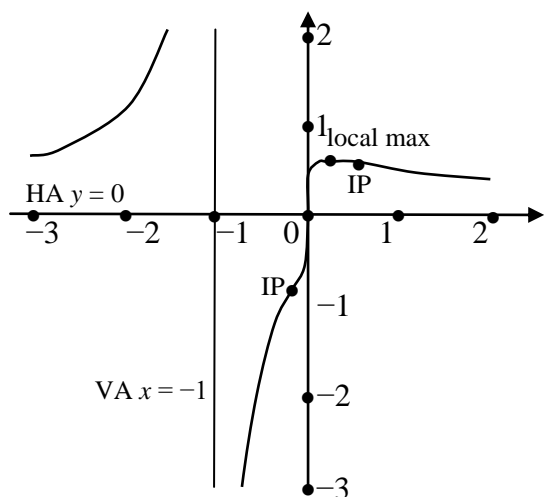
(d) Local maximum at $x = 1/4$. $y(1/4) = \frac{2^{8/5}}{5}$. No local minimum.

(e) The graph of the function is concave up when $x < -1$ or $-\frac{1}{6} < x < 0$ or $x > \frac{2}{3}$, and it is concave down when $-1 < x < -\frac{1}{6}$ or $x < \frac{2}{3}$.

(f) Inflection points: $\left(-\frac{1}{6}, -\frac{6^{4/5}}{5}\right)$, $\left(\frac{2}{3}, \frac{2^{1/5} \cdot 3^{4/5}}{5}\right)$.

(g) Vertical asymptote: $x = -1$, horizontal asymptote $y = 0$.

(h) The graph:



33. $-\frac{1}{2}$.

34. 0.

35. e^{-2} .

36. $\frac{1}{2}$.

37. $A_{\max} = 300 \text{ cm}^2$.

38. $w = \frac{10}{6-\sqrt{3}} \approx 2.343$, $h = \frac{1}{2} \left(10 - \frac{30}{6-\sqrt{3}}\right) \approx 1.485$. $A \approx 5.858$.

39. $x_2 = 1.556684$, $x_3 = 1.327124$, $x_4 = 1.261360$, $x_5 = 1.256462$, $x_6 = 1.256431$.