

Solutions to Student Review Problems

1. 9.16 years
2. Bank 1 = 8%, Bank 2 = 8.11%
You make approx. \$1.11 more in Bank 2.
3. 6.67 years
4. 7 years
5. $R(x) = 12500x$
6. $R(x) = 5.25x$
 $C(x) = 1.25x + 100$
 $P(x) = 4x - 100$
7. $x = 2$
8. B.E. - $x \approx 4.05$
Max profit - $x \approx 1.33$
9. 110
10. (a) $p = -0.005x + 28$
(b) 2000 videos
(c) 4000 videos
11. (a) $p = -0.25x + 32.5$
(b) $P(x) = -0.25x^2 + 27.37x - 200$
(c) ≈ 55 shirts
(d) Must sell \approx between 8 and 102 shirts to have non-negative profit.
12. There is really no good model to accurately depict the situation. Most models have small correlation coefficients and those that don't do not really predict the situation realistically.
13. I would pick quadratic ($y = -0.0470x^2 + 7.6293x - 281.49$) because of the high square of the correlation coefficient and because it predicts that when temperature is too high, production will begin to decrease, which is realistic.
14. (a) Exponential - $y = (658.9436)(0.9966)^x$
(b) ≈ 196
(c) $\approx \$345,297.82$
15. (a) $f(g(x)) = 2x^2 + 3$
Domain is all reals.
(b) $f(g(1)) = 5$
16. (a) $f(g(x)) = (x^3 + 7)^2 + (x^3 + 7) + 1$
(b) $g(f(x)) = (x^2 + x + 1)^3 + 7$
(c) $f(g(5)) = 17557$
(d) $g(f(x)) = 34$
17. $3\sqrt{2}$
18. $\log_a x + 3\log_a y - \frac{1}{2}\log_a z$
19. $\frac{1}{2}\log x + \frac{1}{2}\log y - \log z$
20. (a) $x = \frac{2^{100}}{6}$
(b) $x = 6$
21. (a) 0
(b) $\frac{1}{9}$
22. $f'(x) = 3x^2$
23. $y = 81x - 167$
24. 43
25. (a) $R'(2) = \frac{1}{3}$ - The approx. revenue from selling the third item is \$0.33.
(b) $R'(10) = \frac{1}{5}$ - The approx. revenue from selling the eleventh item is \$0.20.
26. (a) $f'(x) = \frac{1}{2}(x+2)^{-1/2}(2x^3) + (x+2)^{1/2}(6x^2)$
(b) $f'(x) = 6x^2 + 3e^{3x+1}$
(c) $f'(x) = \frac{(x^5-5)(5x^4)-(x^5+5)(5x^4)}{(x^5-5)^2}$
(d) $f'(x) = \left(\frac{e^{4x}}{6x^3-5x^2-1}\right) \left(\frac{e^{4x}(18x^2-10x)-(6x^3-5x^2-1)(4e^{4x})}{(e^{4x})^2}\right)$
(e) $f'(x) = \left[(4x + e^x + 8)e^{(2x^2+e^x+\pi+8x)} + 6 - 4x^{-2}\right]^*$
 $\left[\ln(3x^5 + 5x + 4)^{1/2}\right] +$
 $\left[e^{(2x^2+e^x+\pi+8x)} + 6x + \frac{4}{x}\right] \left[\frac{1}{2} \left(\frac{1}{3x^5+5x+4}\right) (15x^4 + 5)\right]$
(f) $f'(x) = (10x + 3)e^{5x^2+3x-7} + (-12)14^{-12x+3} \ln(14)$
(g) I'll have this answer up after I type everything else in :)
27. $f''(x) = 20x^3 + 24x - 6$
28. $0.5|x^3| + 2$
29. (a) left 8, reflected over x-axis, down 9
(b) left 5, reflected over the x-axis, vertically stretched by a factor of 3, down 0.5
30. Yes - it's a polynomial and all polynomials are continuous.

31. It is continuous everywhere.
32. No VA
HA: $y=2$
33. Use calculator to see graph.
34. CV: $x=0$
Increasing: $(-\infty, 0)$
Decreasing: $(0, \infty)$
Relative max at $x=0$
Check sketch with calculator.
35. Come check with me :)
36. (a) No absolute extremum
(b) Abs. min at $\approx (-1.15, -3.15)$
Abs. max at $(3, 229)$
37. (a) ≈ 0.785 in. by 2.431 in. by 4.431 in.
(b) $\frac{10}{6}$ in. by $\frac{20}{3}$ in. by $\frac{20}{3}$ in.
(c) 1 in. by 4 in. by 4 in.
(d) ≈ 58.07 cubic inches
38. 4 in. by 4 in. by 8 in.
39. (a) $x = y = 20$
(b) $x = 0, y = 40$ or $x = 40, y = 0$
40. (a) ≈ 74.94 ft.
(b) 72 ft.
41. (a) $e^{2x+1} + C$
(b) $4 \ln|x| + 5e^x + 3x^2 + C$
(c) $\frac{4}{3}(x^2 - 4)^{3/2} + C$
(d) $\frac{1}{2} [\ln(4x^2 - 7x)]^2 + C$
(e) $x + 12 \ln|x| + C$
(f) $\frac{1}{10}(2x^3 - 1)^5 + C$
42. (a) ≈ 2.2393
(b) ≈ 3.5589
43. $6 + 2\sqrt{5} - 2\sqrt{2}$
44. Use Riemann - LHS will be an underestimate, RHS will be an overestimate
45. $p(x) = \frac{2}{3}x^{-3/2} + 99\frac{1}{3}$
46. $R(x) = 4e^{-x^2+4} - 4e^4$
47. $R(x) = 40x^2 - 2x^4$
48. $R(x) = 200x - 0.13x^2$
49. $C(s) = 6 \ln|s^2 + 2s + 1| + 2500$
 $C(5) \approx \$2521.50$
50. $R(8) \approx \$8441.29$
51. $C(x) = 260x - 0.0035e^{2x+1} + (65 + 0.0035e)$
52. $\approx 1.263x10^{37}$ (Lots of mosquitos!)
53. ≈ 647
54. ≈ 59.6
55. (a) EP: $\approx (1.66, 14.3)$
CS $\approx \$0.76$
PS $\approx \$15.69$
(b) EP: $\approx (1.81, 19.27)$
CS $\approx \$6.25$
PS $\approx \$3.94$
(c) EP: $\approx (3.89, 19.67)$
CS $\approx \$78.75$
PS $\approx \$39.38$