Math 120

Final Exam Practice Problems, Form: A

Name: _____

- While every attempt was made to be complete in the types of problems given below, we make no guarantees about the completeness of the problems. Specifically, you are responsible for every section covered in lecture.
- If you find typos/errors in these problems (or solutions) please send an email to `d_yasaki@uncg.edu`.

1. Find the line passing through the points $(1, 1)$ and $(-1, 5)$. Write the equation in standard form.

   (a) $y - 2x = 3$

   (b) $y + 2x = 3$

   (c) $y - 2x = -3$

   (d) $y + 2x = -3$

   (e) None of the above.

2. At a local grocery store the demand for ground beef is approximately 50 pounds per week when the price per pound is \$4, but is only 40 pounds per week when the price rises to \$5.50 per pound. Assuming a linear relationship between the demand x and the price per pound p, express the price as a function of demand.

   (a) $p = -0.15x - 11.5$

   (b) $p = 11.5x + 0.15$

   (c) $p = 0.15x + 11.5$

   (d) $p = 11.5x - 0.15$

   (e) $p = -0.15x + 11.5$

3. Compute and simplify the difference quotient $\dfrac{f(x+h) - f(x)}{h}$, where $f(x) = 5x^2 + 7x$.

   (a) $15x - 7h + 14$

   (b) $10x^2 + 5h + 7x$

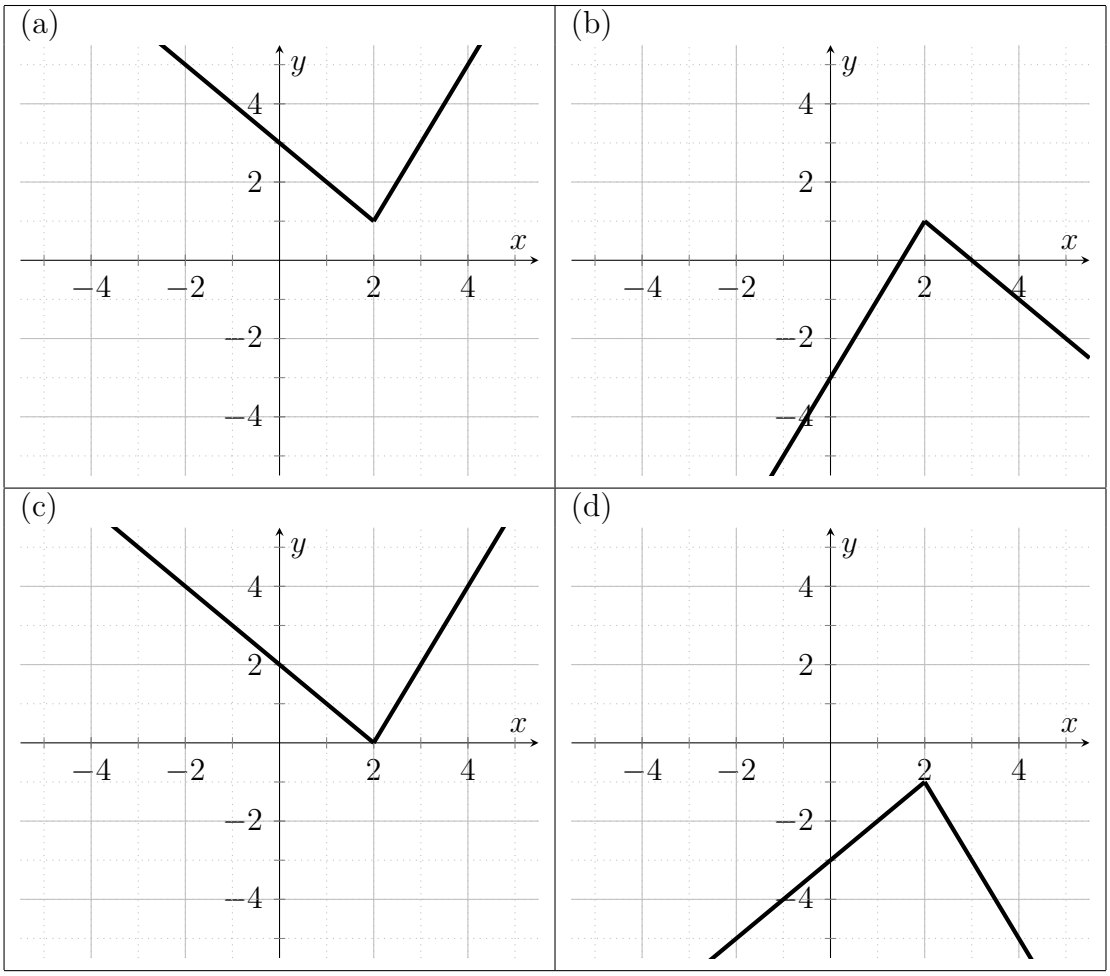
   (c) $10x + 7$

   (d) $10xh + 7h$

   (e) $10x + 5h + 7$

4. Graph the function

$$f(x) = \begin{cases} -x + 3 & \text{if} \quad x < 2 \\ 2x - 3 & \text{if} \quad x \geq 2 \end{cases}$$



(a) (a)

(b) (b)

(c) (c)

(d) (d)

(e) None of the above.

5. Solve the following quadratic inequality. Express your answer in interval notation.

$$x^2 - 11x + 30 > 0$$

(a) $(\infty, 0)$

(b) $(5, 6)$

(c) $(-\infty, 5) \cup (6, \infty)$

(d) $(6, \infty)$

(e) None of the above.

6. Find the vertical asymptote(s) of the graph of the following function:

$$f(x) = \frac{x - 4}{x^2 + 7x}$$

(a) $x = -7, x = 4$

(b) $x = 4, x = 0$

(c) $x = 0$

(d) $x = 0, x = -7$

(e) $x = 0, x = 4, x = -7$

7. Solve for x:

$$2^{4x} = 8^{x+5}$$

(a) -15

(b) -5

(c) 15

(d) 5

(e) None of the above.

8. An initial investment of $\$12,000$ is invested for 2 years in an account that earns 4% interest, compounded quarterly. Find the amount of money in the account at the end of the period.

(a) $\$12,979.20$

(b) $\$12,994.28$

(c) $\$994.28$

(d) $\$12,865.62$

(e) None of the above.

9. Solve for x:

$$\ln(3x-4) = \ln(20) - \ln(x-5)$$

(a) 5 and $\dfrac{5}{3}$

(b) $\dfrac{19}{3}$ and 0

(c) $\dfrac{19}{3}$

(d) -5 and $-\dfrac{19}{3}$

(e) $\dfrac{29}{4}$

10. If $\$4,000$ is invested at 7% compounded annually, how long will it take for it to grow to $\$6,000$, assuming no withdrawals are made? Compute answer to the next higher year if not exact.

(a) 2 years.

(b) 5 years.

(c) 8 years.

(d) 7 years.

(e) 6 years.

11. Find the following limit, if it exists.

$$\lim_{x \to -4} \frac{x^2 - 16}{x + 4}$$

(a) ∞

(b) -8

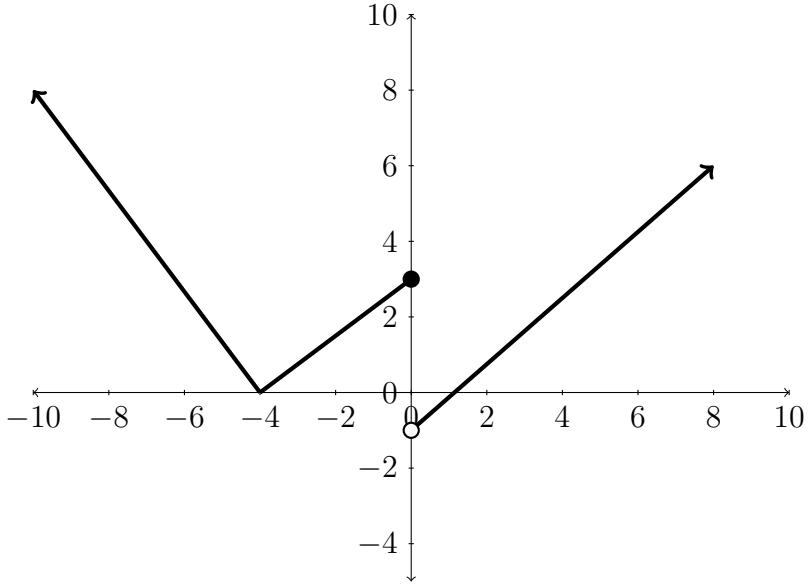
(c) 8

(d) 0

(e) $-\infty$

12. Use the following graph of the function f to evaluate the indicated limits or state that it does not exist.

$$\lim_{x\to 0^-} f(x) \quad \text{and} \quad \lim_{x\to 0^+} f(x)$$



(a) $\lim_{x\to 0^-} f(x) = 3$ and $\lim_{x\to 0^+} f(x)$ does not exist.

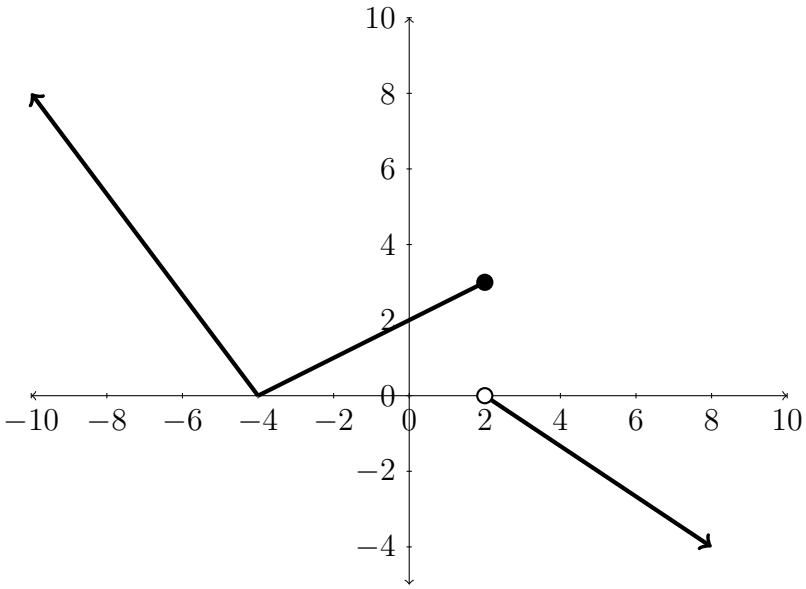
(b) $\lim_{x\to 0^-} f(x) = -1$ and $\lim_{x\to 0^+} f(x) = 3$.

(c) $\lim_{x\to 0^-} f(x)$ does not exist and $\lim_{x\to 0^+} f(x)$ does not exist.

(d) $\lim_{x\to 0^-} f(x) = 3$ and $\lim_{x\to 0^+} f(x) = -1$.

(e) $\lim_{x\to 0^-} f(x)$ does not exist and $\lim_{x\to 0^+} f(x) = -1$.

13. The graph of $f(x)$ is shown. Find all values of x for which f is NOT continuous.



(a) 2

(b) -4

(c) 2 and -4

(d) 0 and 3

(e) None of the above.

14. Solve the inequality and express the answer in interval notation:

$$\frac{x^2 - 4x}{x + 5} > 0$$

(a) $(-5, 0)$

(b) $(4, \infty)$

(c) $(-5, 0) \cup (4, \infty)$

(d) $(-5, \infty)$

(e) $(-\infty, -5) \cup (0, 4)$

15. Determine the limit.

$$\lim_{x \to 5^+} \frac{x^2}{(x-5)^3}$$

(a) 0

(b) ∞

(c) 5

(d) $-\infty$

(e) None of the above

16. Determine the limit.

$$\lim_{x \to \infty} \frac{5x^2 + 7x - 9}{-6x^2 + 2}$$

(a) ∞

(b) $-\frac{5}{6}$

(c) $\frac{2}{9}$

(d) 0

(e) $-\infty$

17. Find the equation of the tangent line to the graph of the function at the given value of x.

$$f(x) = x^2 + 5x, \text{ at } x = 4$$

(a) $y = -\frac{4}{25}x + \frac{8}{5}$

(b) $y = \frac{1}{20}x + \frac{1}{5}$

(c) $y = -39x - 80$

(d) $y = 13x - 16$

(e) None of the above.

18. Find $f'(x)$ if $f(x) = 6x^{-2} + 8x^3 + 11x$.

(a) $f'(x) = -12x^{-1} + 24x^2 + 11$

(b) $f'(x) = -12x^{-3} + 24x^2 + 11$

(c) $f'(x) = -12x^{-3} + 24x^2$

(d) $f'(x) = -12x^{-1} + 24x^2$

(e) $f'(x) = -12x^{-2} + 24x^3 + 11$

19. An object moves along the y-axis (marked in feet) so that its position at time t (in seconds) is given by $f(t) = 9t^3 - 9t^2 + t + 7$. Find the velocity at one second.

(a) 8 feet per second.

(b) 9 feet per second.

(c) 10 feet per second.

(d) 27 feet per second.

(e) 18 feet per second.

20. The demand equation for a certain item is $p = 14 - x/1000$, where x is the demand at price p. The cost equation is $C(x) = 7000 + 4x$. Find the marginal profit at a production level of 3000.

(a) \$14.

(b) \$4.

(c) \$16.

(d) \$7.

(e) \$11.

21. What will the value of an account (to the nearest cent) be after 8 years if \$100 is invested at 6.0% interest compounded continuously?

(a) \$159.38

(b) \$849.47

(c) \$161.61

(d) \$175.32

(e) \$376.23

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

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

(b) $f'(x) = \dfrac{4e^x}{(2e^x + 1)^3}$

(c) $f'(x) = \dfrac{e^x}{(2e^x + 1)^2}$

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

(e) $f'(x) = \dfrac{8e^{2x}}{(2e^x + 1)^2}$

23. Find $f'(x)$ for $f(x) = 4\ln(x^3)$.

(a) $f(x) = 12\ln(x^3)$

(b) $f(x) = \dfrac{12}{x^2}$

(c) $f(x) = 12\ln(x^2)$

(d) $f(x) = \dfrac{4}{x^2}$

(e) $f(x) = \dfrac{12}{x}$

24. Find $f'(x)$ for $(5x^3 + 4)(3x^7 - 5)$. Do not simplify.

(a) $f'(x) = 15x^2(3x^7 - 5) + (5x^3 + 4)(21x^6)$

(b) $f'(x) = 15x^2(21x^6)$

(c) $f'(x) = 15x^2(3x^7 - 5) - (5x^3 + 4)(21x^6)$

(d) $f'(x) = 15x^2 + 21x^7$

(e) $f'(x) = 15(3x^7 - 5)^2$

25. Find $f'(x)$ for $f(x) = (x^2 + 2)^3$.

(a) $f'(x) = (2x)^3$

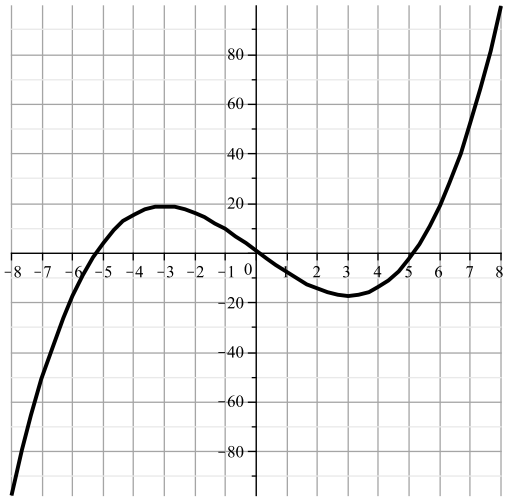
(b) $f'(x) = 3(x^2 + 2)$

(c) $f'(x) = 3(2x + 2)$

(d) $f'(x) = 6x(x^2 + 2)^2$

(e) $f'(x) = (2x)^2$

26. Use the given graph of $f(x)$ to find the intervals on which $f'(x) > 0$.



(a) $f'(x) > 0$ on $(-\infty, -3) \cup (3, \infty)$.

(b) $f'(x) > 0$ on $(3, -3)$.

(c) $f'(x) > 0$ on $(-\infty, -3)$.

(d) $f'(x) > 0$ on $(-\infty, 3)$.

(e) $f'(x) > 0$ on $(0, \infty)$.

27. Find y'' for $y = -\dfrac{1}{3x+4}$.

(a) $y'' = -\dfrac{6}{(3x+4)^3}$

(b) $y'' = -\dfrac{2}{(3x+4)^3}$

(c) $y'' = \dfrac{18}{(3x+4)^3}$

(d) $y'' = -\dfrac{18}{(3x+4)^3}$

(e) $y'' = -\dfrac{9}{(3x+4)^3}$

28. Because of material shortages, it is increasingly expensive to produce 6.2L diesel engines. In fact, the profit in millions of dollars from producing x hundred thousand engines is approximated by $P(x) = -x^3 + 30x^2 + 10x - 52$, where $0 \leq x \leq 20$. Find the inflection point of this function to determine the point of diminishing returns.

    (a) $(10, 114.67)$

    (b) $(10, 1958)$

    (c) $(7.50, 2048)$

    (d) $(10, 2048)$

    (e) None of the above.

29. Where is $f(x) = xe^x$ concave upward?

    (a) $(-\infty, -1)$

    (b) $(-\infty, -2)$

    (c) $(-\infty, 0)$

    (d) $(-1, \infty)$

    (e) $(-2, \infty)$

30. Determine the local extrema, if any, for the function: $f(x) = x^3 + 3x^2 - 24x + 6$.

    (a) Local max at $x = -4$.

    (b) Local max at $x = -4$ and local min at $x = 2$.

    (c) Local min at $x = 2$.

    (d) Local max at $x = 2$ and local min at $x = -4$.

    (e) Local max at $x = 2$

31. Find the absolute maximum and minimum values of $f(x) = 9x^3 - 54x^2 + 81x + 13$ on the interval $[-6, 2]$.

    (a) $\max f(x) = f(1) = 4361$, $\min f(x) = f(-6) = -49$.

    (b) $\max f(x) = f(1) = 49$, $\min f(x) = f(-6) = -4361$.

    (c) $\max f(x) = f(1) = 4361$, $\min f(x) = f(-6) = 49$.

    (d) $\max f(x) = f(2) = 31$, $\min f(x) = f(-6) = -4361$.

    (e) $\max f(x) = f(1) = 49$, $\min f(x) = f(2) = 31$.

32. Find the absolute minimum value of $f(x) = x + \dfrac{9}{x}$ on $(0, \infty)$.

(a) Absolute minimum is 6 at $x = 3$.

(b) Absolute minimum is 10 at $x = 9$.

(c) Absolute minimum is 3 at $x = 6$.

(d) Absolute minimum is 10 at $x = 1$.

(e) Absolute minimum is 6.5 at $x = 4.5$.

33. A carpenter is building a rectangular room with a fixed perimeter of 360 ft. What are the dimensions of the largest room that can be built?

(a) 180 ft by 180 ft.

(b) 90 ft by 270 ft.

(c) 90 ft by 90 ft.

(d) 36 ft by 324 ft.

(e) 60 ft by 60 ft.

34. The annual revenue and cost functions for a manufacturer of zip drives are approximately $R(x) = 520x - 0.02x^2$ and $C(x) = 160x + 100,000$, where x denotes the number of drives made. What is the maximum annual profit?

(a) \$1,820,000

(b) \$1,620,000

(c) \$1,520,000

(d) \$1,720,000

(e) \$1,420,000

35. A computer software company sells 20,000 copies of a certain computer game each year. It costs the company \$1.00 to store each copy of the game for one year. Each time it must produce additional copies, it costs the company \$625 to set up production. Then the storage cost is $S(x) = 0.50x$, and the set up cost is $T(x) = 12500000/x$, where x is the number of games produced in each production run. How many copies of the game should the company produce during each production run in order to minimize its total storage and set-up costs?

(a) 20,000 copies in 1 production run.

(b) 4000 copies in 5 production runs.

(c) 10,000 copies in 2 production runs.

(d) 5000 copies in 4 production runs.

(e) 9000 copies in 3 production runs.

36. Suppose that \$2200 is invested at 3% interest, compounded semiannually. Find the function for the amount of money after t years.

    (a) $A = 2200(1.03)^t$

    (b) $A = 2200(1.0125)^{2t}$

    (c) $A = 2200(1.015)^{2t}$

    (d) $A = 2200(1.015)^t$

    (e) None of the above.

37. A piece of equipment was purchased by a company for \$10,000 and is assumed to have a salvage value of \$3,000 in 10 years. If its value is depreciated linearly from \$10,000 to \$3,000, find a linear equation in the form $V = mt + b$, where t is the time in years, that will give the salvage value at any time t for $0 \leq t \leq 10$.

    (a) $V = -700t - 10000$

    (b) $V = 700t - 10000$

    (c) $t = -700V - 10000$

    (d) $V = -700t + 10000$

    (e) $V = 700t + 10000$

38. A couple just had a baby. How much should they invest now at 5.7% compounded daily in order to have \$45,000 for the child's education 18 years from now? Compute the answer to the nearest dollar.

    (a) \$16,131

    (b) \$14,123

    (c) \$26,530

    (d) \$45,000

    (e) \$32,565

39. How would you divide a 16 inch line so that the product of the two lengths is a maximum?

    (a) 4 and 12 inches

    (b) 8 and 8 inches

    (c) 2 and 14 inches

    (d) 10 and 6 inches

    (e) None of the above.

40. Assume that a savings account earns interest at an annual rate of 2% compounded monthly. How long will it take money invested in this account to double if no withdrawals are made? (round to the nearest year)

    (a) 45 years

    (b) 12 years

    (c) 35 years

    (d) 25 years

    (e) 15 years

41. Find the absolute maximum value of the function $f(x) = \dfrac{8}{x^2+1}$.

    (a) 8

    (b) -8

    (c) 0

    (d) 1

    (e) -1

42. The financial department of a software design company determined that the cost of producing x palm assistants is $C(x) = 5000 + 3x$. The department also determined the price-demand equation to be $p = 23 - \frac{x}{500}$, where p is the price in dollars. Determine the maximum profit.

    (a) \$5,000

    (b) \$25,000

    (c) \$50,000

    (d) \$25,00

    (e) \$45,000

43. Find $f'(x)$ if $f(x) = 9x^{7/5} - 5x^2 + 10000$.

    (a) $f'(x) = 63x/5$

    (b) $f'(x) = 63x^{2/5}/5$

    (c) $f'(x) = \frac{63}{5}x^{2/5} - 10$

    (d) $f'(x) = \frac{63}{5}x^{2/5} - 10x$

    (e) None of the above.

44. Use the first derivative test to determine the local extrema, if any, for the function $f(x) = x^3 - 3x^2 - 24x + 6$.

(a) Local min at $x = 4$.

(b) Local max at $x = -2$ and local max at $x = 4$.

(c) Local min at $x = -2$.

(d) Local min at $x = 4$ and local max at $x = -2$.

(e) None of the above.

45. Find the standard form of the line with slope $-2/7$ passing through the point $(4, 4)$.

(a) $\frac{2}{7}y + x = 36$

(b) $\frac{36}{7}x + y = \frac{2}{7}$

(c) $\frac{2}{7}x + y = \frac{36}{7}$

(d) $\frac{7}{2}x + y = \frac{7}{36}$

(e) None of the above.

46. Find y'' for $y = \sqrt{5x^2 + 4}$.

(a) $10x$

(b) $5x$

(c) $20/(5x^2 + 4)^{(3/2)}$

(d) $10x/(5x^2 + 4)^{(3/2)}$

(e) $5x/\sqrt{5x^2 + 4}$

47. Find $\lim_{x \to -\infty} \dfrac{5x^2 + 3x - 1}{3x^4 + x^2 + 1}$.

(a) ∞

(b) $-\infty$

(c) 0

(d) $5/3$

(e) The limit does not exist.

48. Determine where the function $H(x) = \dfrac{x^2 + 7}{x^2 + x - 6}$ is continuous.

(a) $(2, \infty)$

(b) $x = -3$ and $x = 2$.

(c) $(-3, 2)$

(d) $(-\infty, -3) \cup (2, \infty)$

(e) $(-\infty, -3) \cup (-3, 2) \cup (2, \infty)$

49. Find $f'(x)$ for $f(x) = (e^{x^3} + 3)^4$.

(a) $f'(x) = 12x^2(e^{x^3} + 3)^3$

(b) $f'(x) = (e^{x^3} + 3)^3$

(c) $f'(x) = 4x^2e^{x^3}(e^{x^3} + 3)^3$

(d) $f'(x) = 12x^2e^{x^3}(e^{x^3} + 3)^3$

(e) $f'(x) = 4e^{x^3}(e^{x^3} + 3)^3$

50. Find $\lim_{x\to 3} \dfrac{x+3}{x^2-3x}$.

(a) ∞

(b) $-\infty$

(c) 0

(d) 1

(e) The limit does not exist.

51. Find $\lim_{x\to -1} \dfrac{6x+3}{5x-7}$.

(a) ∞

(b) $-\infty$

(c) 0

(d) 1/4

(e) The limit does not exist.

52. Find the vertical asymptotes of the graph of the function

$$g(x) = \frac{x^2+3x-18}{x^2-2x-15}.$$

(a) $x = 5$ and $x = -3$

(b) $x = 5$

(c) $x = 3$

(d) There are no vertical asymptotes.

(e) None of the above.

53. Find $\lim_{x\to\infty} \dfrac{-x^3+2x^3-7x-1}{2x^2+5x+11}$.

(a) ∞

(b) $-\infty$

(c) 0

(d) $-1/2$

(e) The limit does not exist.

54. A famous painting was sold in 1946 for \$21,770. In 1980 the painting was sold for \$33.2 million. What rate of interest compounded continuously did the investment earn?

(a) 16%

(b) 26.3%

(c) 21.6%

(d) 12.51%

(e) 5.32%

55. Find the equation of the tangent line to the graph of $f(x) = \ln x^7$ at $x = e^2$.

(a) $y = \frac{e^2}{7}x + 7$

(b) $y = \frac{7}{e^2}x + 7$

(c) $y = \frac{7}{2}x + 7$

(d) $y = \frac{7}{e^2}x - 7$

(e) $y = \frac{7}{e^2}x + e^2$

56. Where does $f(x) = 12e^x - e^{2x}$ have an inflection point?

(a) $x = 0$

(b) $x = e^2$

(c) $x = 2\ln 3$

(d) $x = \ln 3$

(e) $x = e^3$

57. Find the derivative of the function $f(x) = 3x^3 \ln x$.

(a) $f'(x) = 9x^2(\ln x)^{-1}$

(b) $f'(x) = 9x^2 \ln x$

(c) $f'(x) = 9x^2$

(d) $f'(x) = 3x^2 + 9x^2 \ln x$

(e) $f'(x) = 3x^2 \ln x$

58. Find the local extrema of the following function: $f(x) = 2x^4 - 56x^3 + 13$.

(a) The function has a local maximum at $x = 0$ and a local minimum at $x = 21$.

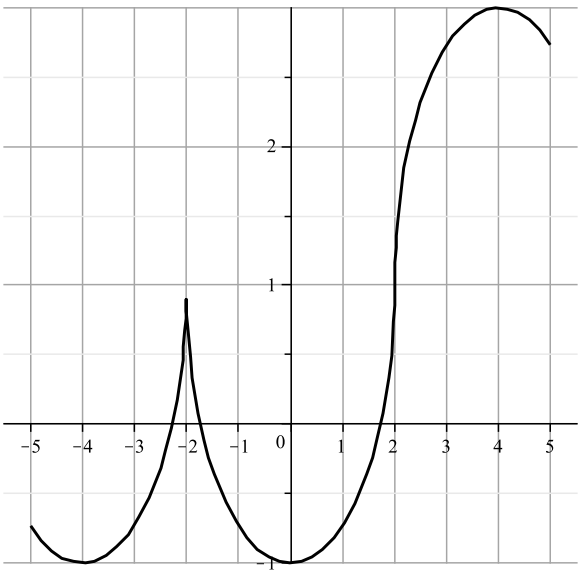
(b) The function has a local maximum at $x = 21$ and a local minimum at $x = 0$.

(c) The function has a local minimum at $x = 0$.

(d) The function has a local minimum at $x = 21$.

(e) The function has no local extrema.

59. Use the following graph of $y = f(x)$ to identify the intervals where $f''(x) > 0$.



(a) $(-5, -4)$, $(-2, 0)$ and $(4, 5)$

(b) $(-5, -2)$ and $(-2, 2)$

(c) $(-5, 2)$

(d) $(2, 5)$

(e) $(-2, 5)$

60. Determine the intervals where the following function is continuous:

$$f(x) = \begin{cases} 1 & \text{if } x \text{ is an integer} \\ -1 & \text{if } x \text{ is not an integer} \end{cases}$$

(a) All the intervals of the form $(i, i + 1)$, where i is an integer.

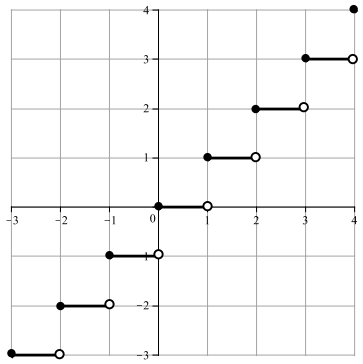
(b) $(-\infty, \infty)$

(c) There are no intervals where the function is continuous.

(d) All the intervals of the form $(i, i + 1)$, where i is a real.

(e) $(-1, 1)$

61. The following is the graph of the greatest integer function, which is denoted $[\![x]\!]$ and is defined as $[\![x]\!]$ = greatest integer $\leq x$.



For which c does the limit $\lim_{x \to c^+} [\![x]\!]$ exist?

(a) For no c.

(b) Only for integer values of c.

(c) For all real values of c.

(d) For all non-integer values.

(e) None of the above.

62. Find all the asymptotes (horizontal and vertical) of $g(x) = \dfrac{x^2 + 5}{5x^2 - 25}$.

(a) $y = 1/5$ and $x = \sqrt{5}$.

(b) $y = 0$, $x = \sqrt{5}$ and $x = -\sqrt{5}$.

(c) $x = \sqrt{5}$ and $x = -\sqrt{5}$.

(d) $y = 1/5$, $x = \sqrt{5}$ and $x = -\sqrt{5}$.

(e) $y = 0$.

63. Find where the inflection points of $f(x) = \ln(x^2 - 4x + 5)$ occur.

(a) $x = 1$

(b) $x = 3$

(c) $x = 1$ and $x = 3$

(d) $x = 2$

(e) There are no inflection points.

64. The fixed costs related to the publication of a book amount to \$60, 270. The variable costs are equal to \$1.60 for each book produced. The book is sold to the distributors for \$18 each. How many books should be produced and sold to break even? Round to the nearest whole number.

(a) 3075 books

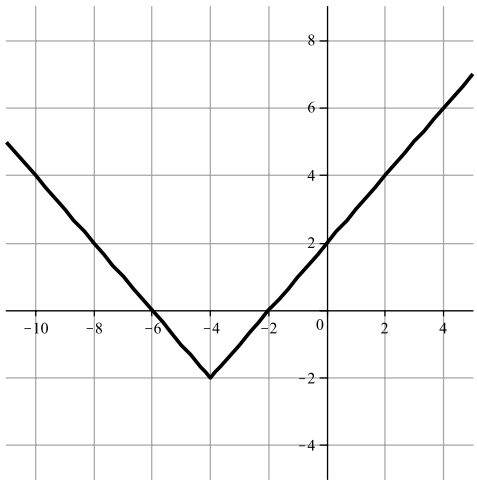
(b) 5357 books

(c) 3675 books

(d) 2093 books

(e) 3348 books

65. Find the equation having the following graph:



(a) $y = |x - 4| - 2$

(b) $y = |x + 2| + 2$

(c) $y = -|x - 4| + 2$

(d) $y = -|x + 4| - 2$

(e) $y = |x + 4| - 2$

66. Solve for x the following equation:

$$2xe^{x^2-1} + x^2e^{x^2-1} = 0$$

(a) $x = 1$, $x = -1$.

(b) There is no solution.

(c) $x = 1$, $x = -1$ and $x = 0$.

(d) $x = -2$, $x = 0$.

(e) None of the above.

67. Find the vertex and the minimum value of the following quadratic polynomial: $f(x) = 2(x-1)^2 + 8$.

(a) Vertex $= (1, 8)$, minimum value $= -8$.

(b) Vertex $= (1, -8)$, minimum value $= -8$.

(c) Vertex $= (1, 8)$, minimum value $= 8$.

(d) Vertex $= (-1, 8)$, minimum value$= 8$.

(e) Vertex $= (-1, 8)$, minimum value$= -8$.

68. Find the vertex of the parabola defined by the equation $f(x) = -2x^2 - 12x - 15$.

(a) $(-3, 33)$

(b) $(-3, 3)$

(c) $(3, 33)$

(d) $(3, 3)$

(e) $(3, -3)$

69. A mathematical model for the decay of radioactive substances is given by $Q = Q_0 e^{rt}$, where Q_0 is the amount of the substance at time $t = 0$, r is the continuous compound rate of decay, t is the time in years and Q is the amount of the substance at time t. If the continuous compound rate of decay of radium per year is $r = -0.0004332$, how long will it take a certain amount of radium to decay to half the original amount (i.e. what is the *half-life* of radium)?

(a) 1 million years.

(b) 2 years.

(c) 800 years.

(d) 1600 years.

(e) 8 years.

70. Find the vertical asymptotes of the graph of $f(x) = \dfrac{x^2 - 4x + 4}{x^2 - 4}$.

(a) $x = 2$.

(b) $x = 2$ and $x = -2$.

(c) $x = -2$.

(d) $x = 1$

(e) None of the above.

71. Find the values of x where the tangent line to the graph of f is horizontal, if

$$f(x) = \sqrt{x^2 - 12x + 40}.$$

(a) $x = 3$

(b) $x = 6$

(c) $x = 9$

(d) $x = 12$

(e) $x = 15$

72. Find the absolute minimum value of $f(x) = x + \dfrac{4}{x}$ on $(0, \infty)$.

(a) 2

(b) 4

(c) -2

(d) 0

(e) 1

73. Find the local maxima and minima of the function $f(x) = 3x^{5/3} - 20x$.

(a) f has a local maximum at $x = -8$ and a local minimum at $x = 8$

(b) f has a local maximum at $x = 8$ and a local minimum at $x = -8$

(c) f has a local maximum at $x = -8$ and a local maximum at $x = 8$

(d) f has a local minimum at $x = -8$ and a local minimum at $x = 8$

(e) None of the above.

74. Find $f'(x)$ for $f(x) = 4^x + \log_4 x$.

(a) $f'(x) = 4^x(\ln 4) + 1/(x \ln 4)$

(b) $f'(x) = 4^x + 1/(x \ln 4)$

(c) $f'(x) = 4^x(\ln 4) + 1/x$

(d) $f'(x) = 4^x + 1/x$

(e) None of the above.

75. Find $f'(x)$ for $f(x) = \dfrac{3e^x}{1+e^x}$.

(a) $f'(x) = \dfrac{3e^x}{(1+e^x)^2}$

(b) $f'(x) = \dfrac{3e^x}{(1+e^x)}$

(c) $f'(x) = \dfrac{3e^{2x}}{(1+e^x)^2}$

(d) $f'(x) = \dfrac{e^x}{(1+e^x)^2}$

(e) None of the above.