MATH 121 Final Exam Practice Problems for ALEKS-trained students

Multiple Choice Section. Write the letter of your answer in the box provided

1. Solve the equation $x^2 - x - 2 = 0$ for x.
(a) $x = 2,1$ **(b)** $x = -2,1$ **(c)** $x = 2,-1$ **(d)** $x = -2,-1$ **(e)** None of the above

2. Write the solution to the inequality $|x| < 12$ using interval notation.
(a) $(-12,12)$ **(b)** $(-\infty, 12)$ **(c)** $(12, \infty)$ **(d)** $(-\infty, -12) \cup (12, \infty)$ **(e)** None of the above

3. Find the distance between the points $(-1,-3)$ and $(2,3)$.
(a) 9 **(b)** $\sqrt{36}$ **(c)** $\sqrt{45}$ **(d)** $(-3,0)$ **(e)** None of the above

Answer:

4. The x-intercepts of $x^2 + y^2 = 16$ are
(a) $(-4,0), (4,0)$ **(b)** $(4,0)$ **(c)** $(-16,0), (16,0)$ **(d)** $(0,-4), (0,4)$

5. Find the slope of the line that is perpendicular to $2x - 5y = 7$.
(a) $\frac{2}{5}$ **(b)** $\frac{-5}{2}$ **(c)** $\frac{5}{2}$ **(d)** -5 **(e)** None of the above.

6. Find the midpoint of the line segment joining the points $\left(\frac{2}{3}, 3\right)$ and $\left(\frac{4}{3}, -9\right)$.
(a) $(1,-3)$ **(b)** $\left(\frac{2}{3}, -12\right)$ **(c)** $\sqrt{32}$ **(d)** $(2,-6)$ **(e)** None of the above

Answer:

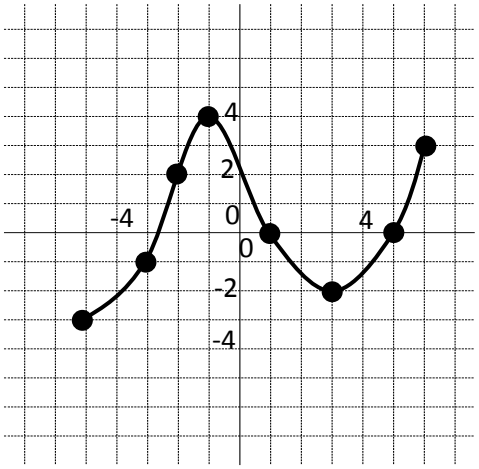
7. Find the equation of the circle in standard form that has center $(1,-3)$ and radius of $\sqrt{5}$.
(a) $(x+1)^2 + (y-3)^2 = \sqrt{5}$ **(b)** $(x-1)^2 + (y+3)^2 = \sqrt{5}$
(c) $(x+1)^2 + (y-3)^2 = 5$ **(d)** $(x-1)^2 + (y+3)^2 = 5$ **(e)** None of the above

Answer:

8. Find the average rate of change of $f(x) = 3^x$ from $x = 1$ to $x = 2$.
(a) 4.5 **(b)** -6 **(c)** 6 **(d)** 9 **(e)** None of the above

Answer:

Use the given graph of the function *f* at the right to answer problems #9-12



9. Determine the absolute maximum value of f.
(a)3 **(b)**4 **(c)** -2

(d -1 **(e)** None of the above

Answer:

10. Find a value of *x* for which $f(x) = 0$
(a) $x = 2$ **(b)** $x = 1$ **(c)** $x = -2$

(d) $x = 3$ **(e)** None of the above

Answer:

11. Find the coordinates of the relative (local) maximum.
(a) $(6,1)$ **(b)** $(1,0)$ **(c)**. $(-1,4)$

(d) $(-3,-3)$ **(e)** None of the above

Answer:

12. Find all of the x- intervals where the graph is increasing.
(a) $(-3,4) \cup (-2,3)$ **(b)** $(3,6)$ **(c)** $(-5,-1) \cup (3,6)$

(d) $(-1,3)$ **(e)** None of the above.

Answer: ☐

13. Choose the only function which is one-to-one.
(a) $f(x) = x^2$ **(b)** $f(x) = -3$ **(c)** $f(x) = 2 - x^2$ **(d)** $f(x) = e^{-3x}$

Answer: ☐

14. Determine the vertex of $f(x) = -2(x-1)^2 - 2$
(a) $(-1,-2)$ **(b)** $(1,-2)$ **(c)** $(-2,-2)$ **(d)** $(-2,7)$

Answer: ☐

15. The zeroes of the polynomial function $f(x) = 4x^4(x-3)(x+1)$ are
(a) $\{0,-3,1\}$ **(b)** $\{0,3,-1\}$ **(c)** $\{4,0,1,-1\}$ **(d)** $\{0,1,-1\}$

Answer: ☐

16. Given that the function $f(x) = \sqrt{x+3}$ is one-to-one, what is the range of $f^{-1}(x)$?

(a) Not enough information is given **(b)** $(-\infty,\infty)$ **(c)** $(-3,\infty)$

(d) $(0,\infty)$ **(e)** [-3,∞)

Answer: ☐

17. The range of $f(x) = ln(x-1)$ is

(a) $(1,\infty)$ **(b)** $(7,\infty)$ **(c)** All real numbers

(d) $(-\infty,1)$ **(e)** None of the above

Answer: ☐

18. Convert the logarithmic equation $log_4 x = \frac{1}{2}$ into exponential form.

(a) $4^{1/2} = x$ **(b)** $x^{1/2} = 4$ **(c)** $4^x = 1/2$ **(d)** $x^2 = 4$ **(e)** None of the above

Answer: ☐

19. Find the exact value of the expression: $e^{2ln(3)}$

(a) 6 **(b)** $e^{ln(10)}$ **(c)** 16 **(d)** 9 **(e)** None of the above

Answer: ☐

20. If e^{-2} is evaluated, the result is:

(a) $ln\left(\frac{1}{5}\right)$ **(b)** 1.001 **(c)** negative **(d)** positive **(e)** None of the above

Answer: ☐

Written problems (show all steps used clearly):

21. For the circle $x^2 + (y-1)^2 = 9$ (a) state the center and radius. Graph the circle. Place the circle correctly on the axes. (b). Find the *x* and *y* intercepts and label them on your graph.

22. Find the distance between the two points (3,-5) and (1,7).

23. Find the midpoint between the two points (3,-5) and (1,7). All three points on the same grid to verify that the midpoint you found lies between the two given points.

24. Graph *f(x)* = $-\sqrt{x-2}$ (a) Label at least two points (b) What is the domain of *f(x)* and its range

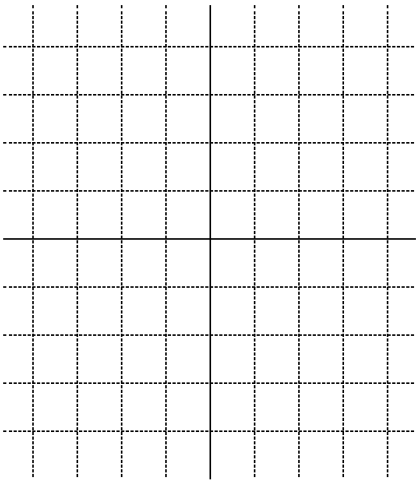
25. For the function *f(x)* =$1-2x^2$, find the average rate of change from *x*=1 to *x*=3

26. For the function in problem 25, compute the difference quotient $\frac{f(x+h)-f(x)}{h}$

27. Given the functions $f(x) = x^2 + 2$ and $g(x) = \sqrt{x-2}$, find and simplify $(f \circ g)(x)$

28. Given $y = x^2 + 2x + 3$

a. Determine the vertex and axis of symmetry..



Vertex: Axis of Symmetry:

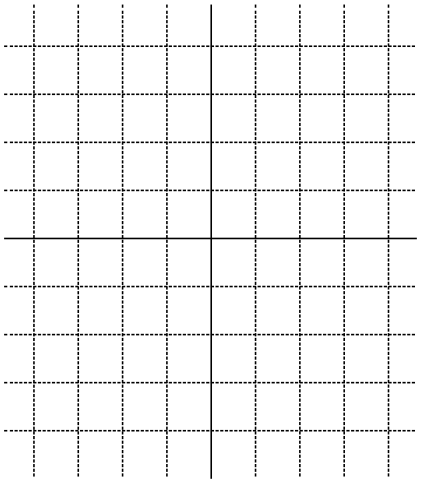
b. Determine the *x* and *y* intercepts (if they exist).

x-intercept(s):

29. Given the function $g(x) = \frac{1}{x+2} + 1$, determine the following and sketch a graph:

(a) The equation of the vertical asymptote.

(b) The equation of the horizontal asymptote.



(c) The y-intercept(s)

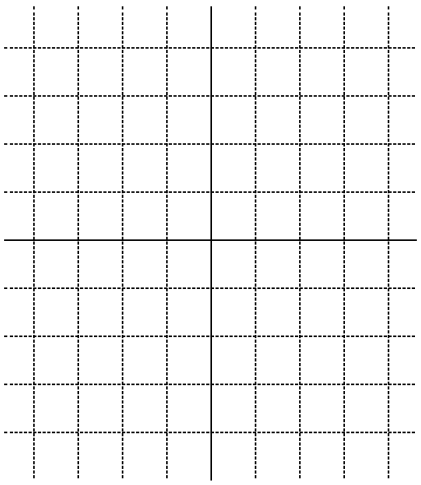
(d) The x-intercept(s)

30. Graph the function $f(x) = \mathrm{e}^{-x} - 1$. State the domain, range, and asymptote of $f(x)$.

Domain:

Range:

Asymptote:



y-intercept:

31. Given that $x^2 + y^2 + 4x - 5y = 2$ is the equation of a circle, determine the center and radius (hint: complete the squares).

Center:

Radius:

32. Find the inverse of the function: $f(x) = \frac{2x}{x-8}$

33. Solve the equation:

$$8e^{-3x} = 40$$

34. Solve the equation:

$$\log_2(x-2)+\log_2(x+2)=5$$

35. Graph *f(x) = ln (x+2)*. Determine (a) domain, (b) range (c) asymptotes, and (d) *x*- and *y*-intercepts

36. Solve $\log_6(x-1)+\log_6(x-2)=1$

37. Solve $7^{x-1}=3^x$

38. Solve $3\ln(x-5)=1$

39. The function $f(x)=\frac{3x}{x+8}$ is one-to-one. (a) What is the domain of *f(x)* (b) What is the range of f^{-1}?

40. What is f^{-1} for the function in problem 39 above? What is the domain of the inverse? What is the range of $f(x)$?

41. Moth balls let outside quickly lose their mass due to sublimation into the surrounding air. Suppose that the mass of the moth balls A in ounces varies with time following the equation $A=A_0e^{-0.03t}$ where A_0 is the initial mass in ounces and *t* is the time in days.

(a) If we start with 6 ounces of math balls, how many ounces will be there after 10 days?

(b) How many days will it take for there to be only 3 ounces of moth balls?

42. For the polynomial function $f(x)=(x-2)^2(x+1)$ (a) what are its zeros and associated multiplicities? (b) Does it cross or touch the x-axis at each of the zeros (c) Determine the end behavior of the graph (example: does it rise/fall on the left and does it rise/fall on the right?)

43. Graph $f(x)=\ln(x+2)$. What is the domain, range, intercepts and asymptotes?

44. Graph $f(x)=x^2-4x+3$. (a) Find the domain and range, (b) What is the vertex and axis of symmetry (c) What are the x-intercepts? (d) Graph the function and label clearly the vertex and intercepts

45. For the rational function $f(x)=\frac{3x^2+2x-8}{x^3-2x^2-3x}$ (a) What is the domain (b) Where are the asymptotes?

46. Graph $f(x)=(x-3)^3$. (a) Label at least two points (b) What is the domain and range (c) Find all intercepts

47. Graph $f(x)=|x|+3$ (a) Label at least three points (b) What is the domain and range (c) Is the function odd, even or neither?

48. Write $\log(x-11)=1$ in exponential form and solve for *x*

49. Given $f(x)=2x^2+3\ and\ g(x)=\sqrt{x-1}$, (a) find $(f\circ g)(x)$ and simplify, (b) find $(f\circ g)(1)$

(c) What is the domain of $(f\circ g)(x)$

50. Solve the inequality $x^3+12x>-8x^2$ Write your answer in interval notation or union of intervals