Final Exam Study Questions

1. Which of the following is the best viewing rectangle for the equation: $y = 4x^3 - 2x + 100$?

a) the standard window b) [-2,2] by [0,100] c) [-100,100] by [-2,2] d) [-5,5] by [-10,120]

2. Given: $f(x) = \dfrac{\sqrt{x^2+4}}{x}$. Find $f(-2)$.

a) -2 b) 0 c) $-2\sqrt{2}$ d) $-\sqrt{2}$

3. Find the solution, graphically, of the equation: $x^2 - 4x = 2x + 7$ in the interval $[-5, 0]$.

a) $x = 1$ b) $x = -1$ c) $x = 0$ d) $x = -4$

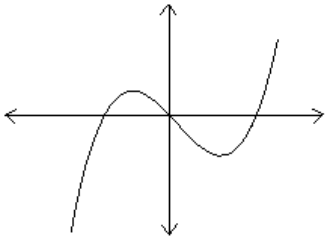
4. Given: $f(x) = x^2 - 3x + 5$. Find $f(t-1)$.

a) $t^2 - 5t + 9$ b) $t^2 - 3t + 7$ c) $t^2 + 6 - 3t$ d) $t^2 - 3t + 4$

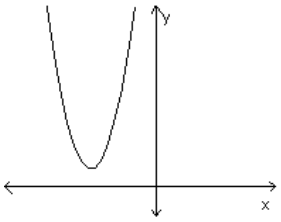
5. Given: $f(x) = x^2 - 2$. Find $\dfrac{f(a+h) - f(a)}{h}$.

a) $a^2 + h$ b) 1 c) $\dfrac{h^2 + 2ah - 4}{h}$ d) $2a + h$

6. Which of the following is NOT a function?

a) 

b) $x^2 + y^2 = 4$

c) 

d) $y = -2x + 5$

7. Which of the following describes the graph of the transformation: $f(x) = x^3$ to $f(x) = (x-4)^3$?

a) there is a shift to the left 4
b) there is a shift up 4
c) there is a shift to the right 4
d) there is a shift down 4

8. Which of the following functions is even?

a) $f(x) = x^3 + 2$ b) $f(x) = x$ c) $f(x) = x^4 - x$ d) $f(x) = 5$

9. Use your calculator to determine which of the following statements is true about the function: $f(x)=2x^2-4x$

a) it is increasing over the interval $(-\infty,0)$ and decreasing over the interval $(0,\infty)$

b) it is decreasing over the interval $(-\infty,0)$ and increasing over the interval $(0,\infty)$

c) it is decreasing over the interval $(-\infty,1)$ and increasing over the interval $(1,\infty)$

d) it is decreasing over the interval $(-\infty,-2)$ and increasing over the interval $(-2,\infty)$

10. Which of the following equations show the function: $f(x)=x^2-8x+8$, in standard form?

a) $f(x)=(x-4)^2-8$ b) $f(x)=8-8x+x^2$ c) $f(x)=(x+4)^2-8$ d) $f(x)=(x-8)^2+4$

11. Which of the following statements is NOT true about the equation: $f(x)=x^2-6x$?

a) It has a local minimum at (3,-9) and crosses the x-axis in two places.

b) It has a vertex at (3,-9) and has a range of $[-9,\infty)$.

c) It is a parabola with no local maximum.

d) It is not a function but it does have a local minimum.

12. Given $f(x)=x^2-1$ and $g(x)=\sqrt{x}$, which of the following is NOT true?

a) the domain of $\left(\frac{f}{g}\right)(x)$ is $(0,\infty)$

b) $(f\circ g)(x)=x-1$

c) $(g\circ f)(x)=x-1$

d) $(f-g)(x)=x^2-\sqrt{x}-1$

13. Given $f(x)=\frac{x-3}{2}$. Find $f^{-1}(x)$.

a) $3x+2$ b) $2x+3$ c) $\frac{x+2}{3}$ d) $\frac{2}{x}-\frac{x}{3}$

14. Which of the following describes the end behavior of the graph of: $y=-\frac{1}{4}x^4+3x^2$?

a) $y\to\infty$ as $x\to-\infty$ and $y\to\infty$ as $x\to\infty$

b) $y\to-\infty$ as $x\to-\infty$ and $y\to\infty$ as $x\to\infty$

c) $y\to-\infty$ as $x\to 0$ and $y\to 0$ as $x\to\infty$

d) $y\to-\infty$ as $x\to-\infty$ and $y\to-\infty$ as $x\to\infty$

15. Use synthetic division and the remainder theorem, to find $P(-1)$ when $P(x)=3x^4+x^2-2x-4$.

a) -4 b) 2 c) -2 d) 0

16. Which of the following polynomials has zeros: $3, 0, -2, -1$.

a) $P(x)=(x+3)(x-2)(x-1)$ c) $P(x)=x(x+3)(x-2)(x-1)$

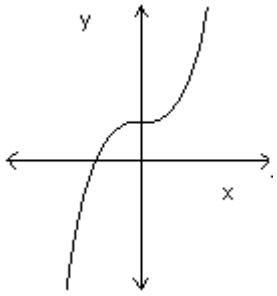
b) $P(x)=(x-3)(x+2)(x+1)$ d) $P(x)=x(x-3)(x+2)(x+1)$

17. A polynomial function, $f(x)$, is divided by $(x+5)$ and the remainder is found to be: $R=0$. Therefore:

a) $(x-0)$ is a factor of $f(x)$ c) $(x-5)$ is a factor of $f(x)$

b) 0 is one of the roots of $f(x)$ d) -5 is a root of $f(x)$

18. Which of the following functions below represents the graph to the right? $(c>0)$



a) $-x^3-c$ b) x^3-c c) $-x^3+c$ d) x^3+c

19. Use your calculator to determine the local minimum value of the function: $f(x)=x^5-x$.

a) -0.535 b) 0 c) 1 d) 0.535

20. A fourth degree polynomial has roots $-2, 0.492, \text{ and } -2+3i$. Which of the following is true?

a) These are the only roots of the polynomial since $4-1=3$.
b) The last root is $2+3i$.
c) The last root is 0.
d) The last root is $-2-3i$.

21. Which of the following quadratic functions has a vertex at $(-2,4)$ and has imaginary roots?

a) $f(x)=-(x+2)^2+4$ c) $f(x)=-(x+2)^2-4$

b) $f(x)=(x+2)^2+4$ d) $f(x)=(x-2)^2+4$

22. What are the x- and y-intercepts of the rational function: $f(x)=\dfrac{x-2}{x-4}$?

a) $(0,0)$ and $(0,2)$ b) $(2,0)$ and $(4,0)$ c) $(2,0)$ and $\left(0,\frac{1}{2}\right)$ d) $\left(\frac{1}{2},0\right)$ and $(0,4)$

23. What are the horizontal and vertical asymptotes of the rational function: $f(x)=\dfrac{x+1}{x^2+2x-3}$?

a) $y=-1, x=-3, x=-1$ c) $y=-\dfrac{1}{3}, x=3, x=-1$

b) $y=0, x=-3, x=2$ d) $y=0, x=-3, x=1$

24. Which of the following functions has a graph that will **not** pass through the point $(0,1)$?

a) $f(x)=e^x$ b) $f(x)=\ln x$ c) $f(x)=20^x$ d) $f(x)=1$

25. Which of the following functions has domain: $(-\infty,\infty)$ and range: $(-3,\infty)$?

a) $f(x)=-3^x$ b) $f(x)=2^x-3$ c) $f(x)=x^{-3}$ d) $f(x)=2^{x-3}$

26. If $7,000 is invested at 8% annual interest compounded continuously, what amount will it grow to after 10 years?

a) $15,578.79 b) $75,830.09 c) $7,560.00 d) $12,600.00

27. The graph of the function: $f(x)=e^{-2x}+2$ will pass through which of the following points?

a) $(-2,2)$ b) $(0,2)$ c) $(0,3)$ d) $(2,0)$

28. Which of the following are the domain and range for $f(x)=e^{-x}$?

a) $D:(0,\infty)\quad R:(0,\infty)$ c) $D:(-\infty,\infty)\quad R:(0,\infty)$

b) $D:(-\infty,\infty)\quad R:(-\infty,\infty)$ d) $D:(-\infty,\infty)\quad R:(-\infty,0)$

29. Which of the following exponential forms is equivalent to: $\log_9 3=\dfrac{1}{2}$?

a) $3^{\frac{1}{2}}=9$ b) $\left(\dfrac{1}{2}\right)^3=9$ c) $9^{1/2}=3$ d) $e^{9/2}=3$

30. Which of the following is the value of $\log_a 1$?

a) 1 b) 0 c) a d) e

31. Use a calculator to evaluate the expression: $\ln\sqrt{3}$, correct to four decimal places.

a) 0.5493 b) 0.5495 c) 0.5490 d) 0.6000

32. Compared with the function: $f(x)=\ln x$, the function: $f(x)=-\ln(x+2)$ would

a) be shifted up 2 and reflected in the line $y=x$.
b) be shifted left 2 and reflected in the x-axis.
c) be shifted right 2 and reflected in the y-axis.
d) be shifted down 2 and reflected in the y-axis.

33. Which of the following is the domain of the function: $f(x)=\ln(x-2)$?

a) $(-\infty,\infty)$ b) $(2,\infty)$ c) $(0,\infty)$ d) $(2,2)$

34. Write $4^2=16$ in logarithmic form.

a) $\log_2 4=16$ b) $\ln 16\approx 2.773$ c) $\log_4 16=2$ d) $\log 16\approx 1.204$

35. Which of the following is not true concerning logarithms?

a) $\log_a c^x = x\log_a c$

b) $\log_a 1=0$

c) $\dfrac{(\log 15)^2}{\log 3}=2\log 15-\log 3$

d) $\log_2\left(x^3y\right)=3\log_2 x+\log_2 y$

36. Use the laws of logarithms to rewrite the expression in a form with no logarithm of a product, quotient, or power: $\ln\left(x\sqrt{x+1}\right)$.

a) $(\ln x)\left(\ln(x+1)\right)^{1/2}$

b) $\dfrac{1}{2}\ln x+\ln(x+1)$

c) $\ln x+\dfrac{1}{2}\ln(x+1)$

d) $(\ln x)\left[\dfrac{1}{2}\left(\ln(x)+\ln(1)\right)\right]$

37. Evaluate $\log_3 13$ using the change of base formula.

a) 1.114 b) 2.335 c) 0.477 d) 4.333

38. Solve for x: $2^{3x} = 25$.

a) $x \approx 1.548$ b) $x \approx 2.22$ c) $x \approx 2.924$ d) $x \approx 0.569$

39. Solve for x: $3e^{2x} - 5 = 13$.

a) $x = 3$ b) $x = \ln 3$ c) $x = 2\ln 3$ d) $x = \frac{1}{2}\ln 6$

40. Solve for x: $\log x + \log(x+3) = 1$.

a) $x = \pm 2$ b) $x = 0, x = -3$ c) $x = -2$ d) $x = 2$

Use the matrices: $A = \begin{bmatrix} 3 & -1 \\ 2 & -2 \end{bmatrix}, B = \begin{bmatrix} -1 & 1 \\ 5 & 2 \end{bmatrix}, C = \begin{bmatrix} 3 & 0 & 1 \\ -2 & 1 & -4 \end{bmatrix}$ for #41, #42, and #43.

41. Find $2A - B$.

a) $\begin{bmatrix} 10 & 0 \\ -1 & 2 \end{bmatrix}$ b) $\begin{bmatrix} 5 & -2 \\ -1 & 2 \end{bmatrix}$ c) $\begin{bmatrix} 7 & -3 \\ -1 & -6 \end{bmatrix}$ d) these operations are not possible

42. Find BC.

a) $\begin{bmatrix} -3 & -1 \\ 10 & -4 \end{bmatrix}$ b) $\begin{bmatrix} -1 & -1 \\ 5 & 2 \\ -21 & -7 \end{bmatrix}$ c) $\begin{bmatrix} -5 & 1 & -5 \\ 11 & 2 & -3 \end{bmatrix}$ d) this operation is not possible

43. Determine which of the following statement is true.

a) $AB = BA$
b) If the determinant of $A = 0$, then A^{-1} exists.
c) If A^{-1} exists then the determinant of $A = 0$.
d) If the determinant of $A \neq 0$, then A^{-1} exists.

44. Which of the following shows the appropriate matrix method to solve: $\begin{cases} -x + y = 4 \\ -2x + y = 0 \end{cases}$

a) $\begin{bmatrix} 4 \\ 0 \end{bmatrix}^{-1} \begin{bmatrix} -1 & 1 \\ -2 & 1 \end{bmatrix}$ b) $\begin{bmatrix} -1 & 1 \\ -2 & 1 \end{bmatrix} \begin{bmatrix} 4 \\ 0 \end{bmatrix}$ c) $\begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} 4 \\ 0 \end{bmatrix}^{-1}$ d) $\begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} 4 \\ 0 \end{bmatrix}$

45. Which of the following statements is not true?

a) $AA^{-1} = A^{-1}A = I$ and the determinant of $A \neq 0$.
b) Since $AI = A$, then I is a matrix with every entry as 1.
c) $I = I^{-1}$
d) $AI = IA$

46. Find the 12th term of the sequence: $a_n = 3 + \frac{(-1)^n 2}{n}$.

a) $\frac{1}{2}$ b) $3\frac{1}{6}$ c) $-\frac{5}{12}$ d) 1

47. Find the third and fourth terms of the given recursively defined sequence: $a_n = 2(a_{n-1} + 3)$ and $a_1 = 2$.

a) 10 and 12 b) 10 and 20 c) 10 and 26 d) 26 and 58

48. Find the first two partial sums of the sequence $a_n = \frac{\sqrt{n}}{n^3}$.

a) $1, 1 + \frac{\sqrt{2}}{8}$ b) $\frac{1}{3}, 1 + \frac{\sqrt{2}}{6}$ c) $1, 1 + \frac{\sqrt{2}}{2}$ d) $1, \sqrt{2}$

49. Find the sum of $\sum_{k=1}^{5} \frac{k}{2}$.

a) 60 b) 12 c) $\frac{15}{2}$ d) 3

50. Given the sum: $1 + 3 + 5 + 7 + ... + 21$ find the representative sigma notation.

a) $\sum_{n=0}^{10} 2n + 1$ b) $\sum_{n=0}^{20} n + 1$ c) $\sum_{n=1}^{19} n + (n + 2)$ d) $\sum_{n=2}^{11} 2n - 1$

ANSWERS

1. D	2. D	3. B	4. A	5. D	6. B	7. C	8. D	9. C	10. A	11. D	12. C	13. B	14. D
15. B	16. D	17. D	18. D	19. A	20. D	21. B	22. C	23. D	24. B	25. B	26. A	27. C	28. C
29. C	30. B	31. A	32. B	33. B	34. C	35. C	36. C	37. B	38. A	39. D	40. D	41. C	42. C
43. D	44. D	45. B	46. B	47. D	48. A	49. C	50. A						