Algebra 2 / Trig Honors
Final Exam Review Ch 8, 10-14

Chapter 8

1. Evaluate without a calculator: $\log_2 \frac{1}{4}$

2. Solve for x: a) $\log_x \frac{1}{25} = \frac{-2}{3}$ b) $4^x = \frac{1}{8^{x+1}}$ c) $27^{5x} = 81^{3x+4}$

   d) $20^{3x+1} - 5 = 35$ e) $5e^{-x+4} = 22$

3. Expand the expression: $\log \sqrt[5]{x^2 y^3}$

4. Condense the expression to a single log: $\frac{2}{3}\log_4 7 + \log_4 10 - 2$

5. Solve for x in terms of e: $\ln(x+2) = 5$

6. The amount of money, A, in a bank account at the end of t years when compounded quarterly is given by $A = P\left(1+\frac{r}{4}\right)^{4t}$, where P is the amount invested and r is the annual interest rate.
   If a person invests \$5000 in an account that pays 6% interest compounded quarterly, find the amount he will have, to the nearest dollar, at the end of 10 years.

7. One hundred grams of radium is stored in a container. The amount R (in grams) or radium present after t years is given by $R = 100e^{-0.000043t}$. To the nearest hundredth of a gram, how much of the radium remains after 10,000 years?

Chapter 10

8. Find the distance between (-4, -2) and (3, 10). Then find the midpoint of the segment connecting those points.

9. Write the equation of a circle with center at (-8, 0) and radius 5.

10. Write the equation of an ellipse with center at (0, 0), vertex at (4, 0) and co-vertex at (0, 2).

11. Write the equation of a parabola in vertex form:
    a) with directrix $y = 5$ and focus (- 4, - 1)
    b) with focus (3, 2) and vertex (- 2, 2)

12. Write the equation of an ellipse with foci (9, - 2) and (- 3, - 2) and major axis of length 18.

13. Write the equation of a hyperbola with vertices (5, 4) and (5, - 4) and foci (5, 6) and (5, - 6).

14. Solve the system: $\begin{aligned} 5x^2 + 3y^2 &= 17 \\ -x + y &= -1 \end{aligned}$

Chapter 11

15. Write a rule for the *n*th term of the sequence -9, -10, -11, -12, ...

16. Write a rule for the *n*th term of the sequence $5, \frac{-5}{2}, \frac{5}{4}, \frac{-5}{8}, \ldots$

17. In an arithmetic sequence, $a_5 = 23$ and $a_{38} = 155$. Find a_{57}.

18. 5120 is which term of the sequence 5, 20, 80, . . .

19. Find the sum of the series $\sum_{i=1}^{6} (i - 10)$.

20. Find the sum of the first 30 terms of the series $3 + 7 + 11 + 15 + \ldots$

21. Find the sum of the infinite geometric series $2 + 1 + 0.5 + 0.25 + \ldots$

22. Find the sum of the first 10 terms of the series $1 + 5 + 25 + 125 + 625 + \ldots$

23. Find the sum: $\sum_{n=0}^{\infty} 3\left(\frac{1}{8}\right)^n$

24. Write the first 5 terms of the sequence: $a_1 = 4,\ a_2 = 6,\ a_n = 2a_{n-2} + 3a_{n-1}$

Chapter 12

25. You are eating dinner at a restaurant. The restaurant offers 6 appetizers, 12 main dishes, 6 side orders, and 8 desserts. If you order one of each of these, how many different dinners can you order?

26. Find the number of distinguishable permutations of the letters in CALIFORNIA.

27. *Mama Mia's Pizza Co.* offers 3 kinds of crusts and 12 pizza toppings. Find the number of ways you could you choose:
    a) the crust and 3 different toppings
    b) 2 or 3 toppings for a thin crust pizza

28. Fifteen students enter an essay contest. How many ways can 1st, 2nd, 3rd, and 4th places be awarded?

29. You are asked to select 3 novels from a list of 10 to read for an independent study project. In how many ways can you choose which books to read?

30. Expand $(x^2 + 3y)^4$.

31. Find and simplify the third term of $(2x+5)^{10}$.

32. A jar contains 4 red marbles, 2 blue marbles, and 6 green marbles
    a) Find the probability of selecting a red or a blue marble.
    b) Without replacement, find the probability of selecting a red, then a green.
    c) With replacement, find the probability of selecting a blue, then a red.

33. Of eleven persons attending a conference, 4 are executives and 6 are women. Three of the executives are women. One of these eleven attendees is selected at random. Find the probability that the person selected is:
    a) an executive or a woman b) not a woman

34. From a 52-card deck, 4 cards are dealt out at random. Find the probability the 4 cards are 2 kings and 2 red non-face cards.

(#35 + #36 wandered away . . .)

Chapter 13

37. Convert 210° to radians.

38. Convert $\frac{-5\pi}{4}$ to degrees.

39. The terminal side of an angle θ in standard position passes through (- 4, - 1). Find the exact simplified values for a) $\sin\theta$ b) $\tan\theta$ c) $\sec\theta$.

40. Evaluate sec (-30°) without using a calculator.

41. Evaluate $\sin\left(\frac{-7\pi}{4}\right)$ without using a calculator.

42. Evaluate $\tan^{-1}\sqrt{3}$. Give answer in both degrees and radians.

43. Evaluate $\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)$. Give answer in both degrees and radians.

44. Find the exact value in simplest form for $\cot\left(\cos^{-1}\left(\frac{-1}{5}\right)\right)$.

45. Solve Δ ABC, if $\angle A = 22°$, b = 16, $\angle C = 90°$.

46. Find b in Δ ABC, if $\angle B = 85°$, c = 6, $\angle A = 57°$.

47. Solve Δ ABC, if $\angle A = 60°$, b = 33, c = 15.

48. Find $\angle A$ in Δ ABC, if a = 28, b = 23, and c = 17.

49. Find the area of Δ ABC, if b = 9, a = 7, and $\angle C = 116°$.

50. Find the area of Δ ABC, if a = 10, b = 11, and c = 12.

Chapter 14

51. Solve $6 + 10 \sin x = 1$ over the interval $0° \le x < 360°$.

52. Solve $\sec^2 x - 2\tan x = 0$ over the interval $0 \le x < 2\pi$.

53. If $\tan A = \frac{3}{4}$, where $0 \le A < \frac{\pi}{2}$ and $\cos B = \frac{-8}{17}$, where $\frac{\pi}{2} \le B \le \pi$, find the exact value, in simplest form, for:

    a) $\sin(A + B)$ b) $\cos(A - B)$ c) $\tan(A - B)$

    d) $\sin 2A$ e) $\cos 2B$ f) $\tan 2B$

54. Use an identity to find the exact value in simplest form for: a) $\cos 165°$ b) $\tan 112.5°$

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Answers:

1. -2 2. a) 125 b) $\frac{-3}{5}$ c) $\frac{16}{3}$ d) .077 e) 2.518 3. $\frac{2}{5}\log x + \frac{3}{5}\log y$

4. $\log_4 \frac{5\sqrt[3]{49}}{8}$ 5. $e^5 - 2$ 6. \$9070 7. 65.05 grams

8. distance $\approx$ 13.9, midpoint $\left(\frac{-1}{2}, 4\right)$ 9. $(x+8)^2 + y^2 = 25$ 10. $\frac{x^2}{16} + \frac{y^2}{4} = 1$

11. a) $y = \frac{-1}{12}(x+4)^2 + 2$ b) $x = \frac{1}{20}(y+2)^2 - 2$ 12. $\frac{(x-3)^2}{81} + \frac{(y+2)^2}{45} = 1$

13. $\frac{y^2}{16} - \frac{(x-5)^2}{20} = 1$ 14. $\left(\frac{7}{4}, \frac{3}{4}\right)$, (-1, -2) 15. $a_n = -n - 8$

16. $a_n = 5\left(\frac{-1}{2}\right)^{n-1}$ 17. 231 18. 6th term 19. -39 20. 1830

21. 4 22. 2,441 406 23. $\frac{24}{7}$ 24. 4, 6, 26, 90, 322 25. 3456

26. 907,200 27. a) 660 b) 286 28. 32,760 ways 29. 120 ways

30. $x^8 + 12x^6 y + 54x^4 y^2 + 108x^2 y^3 + 81y^4$ 31. $288{,}000x^8$

32. a) $\frac{1}{2}$ b) $\frac{2}{11}$ c) $\frac{1}{18}$ 33. a) $\frac{7}{11}$ b) $\frac{5}{11}$ 34. $\frac{228}{54145}$ or $\approx .004$

37. $\frac{7\pi}{6}$ 38. -225° 39. a) $\frac{-\sqrt{17}}{17}$ b) $\frac{1}{4}$ c) $\frac{-\sqrt{17}}{4}$ 40. $\frac{2\sqrt{3}}{3}$

41. $\frac{\sqrt{2}}{2}$ 42. 60°, $\frac{\pi}{3}$ 43. 150°, $\frac{5\pi}{6}$ 44. $\frac{-\sqrt{6}}{12}$

45. $\angle B = 68°$, $a \approx 6.5$, $c \approx 17.3$ 46. $b \approx 9.7$ 47. $a \approx 28.6$, $\angle C \approx 27{,}0°$, $\angle B \approx 93.0°$

48. $\angle A \approx 87.5°$ 49. 28.3 units^2 50. 51.5 units^2 51. 210°, 330°

52. $\frac{\pi}{4}, \frac{5\pi}{4}$ 53. a) $\frac{36}{85}$ b) $\frac{13}{85}$ c) $\frac{-84}{13}$ d) $\frac{24}{25}$ e) $\frac{-161}{289}$ f) $\frac{240}{161}$

54. a) $\frac{-\sqrt{6} - \sqrt{2}}{4}$ or $\frac{-\sqrt{2+\sqrt{3}}}{2}$ b) $-\sqrt{2} - 1$