1. Simplify: $\left(\frac{q^5}{r^3}\right)^9$ [A] $\frac{q^{45}}{r^{27}}$ [B] $\frac{q^{45}}{r^3}$ [C] $\frac{q^{14}}{r^{12}}$ [D] $\frac{q^{14}}{r^3}$

2. Use synthetic substitution to evaluate $f(f)=3f^3+6f^2+7f-11$ when $f=6$.

[A] $f(f)=157$ [B] $f(f)=895$ [C] $f(f)=887$ [D] $f(f)=898$

3. Add: $(3h^5-4h^4+4)+(2h^5+2h-4)$ $5h^5-4h^4+2h$

[A] $5h^5-2h^4$ [B] h^5-4h^4-2h+8 [C] h^5-4h^4+2h+8 [D] $5h^5-4h^4+2h$

4. If there are initially 3500 bacteria in a culture, and the number of bacteria double each hour, the number of bacteria after t hours can be found using the formula $N=3500(2^t)$. How long will it take the culture to grow to 50,000 bacteria?

[A] 2.3 hr [B] 1.15 hr [C] 3.84 hr [D] 23.25 hr

5. Solve the equation. Check for extraneous solutions. $\sqrt[3]{x-8}=-5$ $x-8=-125$ $x=$

[A] 33 [B] 133 [C] −117 [D] −117, 133

6. Find the sum of the first 13 terms of the arithmetic series. $t_1=-10$ $t_{13}=62$

$-10 - 4 + 2 + 8 + \ldots$

[A] 676 [B] 332 [C] 338 [D] 344 $\frac{13(-10+62)}{2}$

7. Solve for x to the nearest hundredth: $7.19^x = 36$ $x=\frac{\log 36}{\log 7.19}$

[A] 1.82 [B] 0.55 [C] 0.86 [D] 1.56

8. Find the common difference of the arithmetic sequence.

−4.6, −3.9, −3.2, −2.5, . . .

[A] 0.6 [B] 0.7 [C] −0.7 [D] −0.6

Hint Hint, Nudge Nudge!

Review Sem 2 Final

p. 345

long div/synth

$\sqrt[3]{}$

end behavior

circle

21 43 31 33 12 9

10% growth

9. The projected worth (in millions of dollars) of a large company is modeled by the equation $y = 236(1.1)^x$. The variable x represents the number of years since 1997. What is the projected annual percent of growth, and what should the company be worth in 2009?

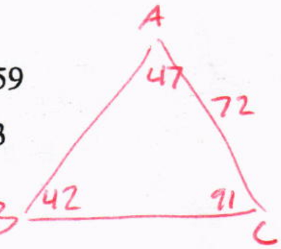
[A] 10%; \$673.34 million [B] 20%; \$814.74 million yrs: 12

[C] 20%; \$259.60 million [D] 10%; \$740.67 million $236(1.1)^{12}$

10. Solve triangle ABC given that $A = 47°$, $B = 42°$, and $b = 72$.

[A] $C = 91°$, $a = 78.7$, $c = 107.59$ [B] $C = 271°$, $a = 78.7$, $c = 107.59$

[C] $C = 271°$, $a = 65.87$, $c = 98.43$ [D] $C = 91°$, $a = 65.87$, $c = 98.43$

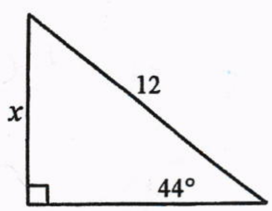


$\frac{\sin 91}{c} = \frac{\sin 42}{72} = \frac{\sin 47}{a}$

11. Express as a single logarithm: $\log_b 7 + \log_b 50$

[A] $\log_b(7+50)$ [B] $\log_b\left(\frac{7}{50}\right)$ [C] $\log_b 7^{50}$ [D] $\log_b 350$

12. Evaluate x. Round the result to the nearest hundredth.



$\sin 44 = \frac{x}{12}$

[A] $x = 12.43$ [B] $x = 8.34$ [C] $x = 8.63$ [D] $x = 11.59$

13. Subtract: $(-7x^2 + 4x - 8) - (x^2 - 6x - 8)$ $-8x^2 + 10x$

[A] $-8x^2 - 10x$ [B] $-8x^2 - 2x - 16$ [C] $-8x^2 + 10x - 16$ [D] $-8x^2 + 10x$

14. Find all the zeros of the function: $f(x) = -3(-x-2)(-5x-7)(x+1)$
2 $-\frac{7}{5}$ -1

[A] $\frac{2}{3}, \frac{7}{15}, \frac{1}{3}$ [B] $-\frac{2}{3}, -\frac{7}{15}, -\frac{1}{3}$ [C] $2, \frac{7}{5}, 1$ [D] $-2, -\frac{7}{5}, -1$

$2, -\frac{7}{5}$

$$2x-1\overline{)\,-4x^3-4x^2+x+10}$$

Quotient: $-2x^2-3x-1$

$-4x^3+2x^2$

$-6x^2+x+10$

$-6x^2+3x$

$-2x+10$

$-2x+1$

9

15. Divide by using long division: $(-4x^2-4x^3+10+x)\div(2x-1)$

[A] $-2x^2+3x+\dfrac{10}{2x-1}$ [B] $-2x^2-3x-1+\dfrac{9}{2x-1}$

[C] $-2x^2-3x+\dfrac{10}{2x-1}$ [D] $-2x^2+3x+1+\dfrac{9}{2x-1}$

16. The surface area of a tennis ball is 21.43 in^2. The surface area of a baseball is 23.75 in^2. Find the ratio of the volumes of a tennis ball to a baseball. Surface Area = $4\pi r^2$ and Volume = $\dfrac{4}{3}\pi r^3$.

	Base	tennis
SA	23.75	21.43
V	10.88	9.33

[A] 0.902 [B] 0.857 [C] 0.950 [D] 0.757

17. Find the sum of the geometric series: $20 - 4 + \dfrac{4}{5} - \dfrac{4}{25} + \ldots$

$\dfrac{20}{1-\frac{-1}{5}} = \dfrac{100}{5+1}$

$\dfrac{100}{6}$

$\dfrac{50}{3}$

[A] $\dfrac{12{,}499}{750}$ [B] $\dfrac{62{,}499}{3750}$ [C] $\dfrac{50}{3}$ [D] $\dfrac{33}{2}$

18. Which of the following is an equation for the inverse of the function $f(x) = 4x - \dfrac{1}{3}$?

$x = 4y - \frac{1}{3}$

$x + \frac{1}{3} = 4y$

$\dfrac{x+\frac{1}{3}}{4} = y$

[A] $g(x) = \dfrac{4}{3}x + \dfrac{1}{4}$ [B] $g(x) = \dfrac{3}{4}x - \dfrac{1}{4}$

[C] $g(x) = \dfrac{1}{4}x + \dfrac{1}{12}$ [D] $g(x) = \dfrac{1}{3}x - \dfrac{1}{12}$

19. Multiply: $(x-2)(x^2+3x-3)$

[A] x^3+x^2-9x+6 [B] x^3+3x^2+6 [C] x^3-5x^2-9x+6 [D] x^3+x^2+3x+6

20. In a financial deal, you are promised \$700 the first day and each day after that you will receive 65% of the previous day's amount. When one day's amount drops below \$1, you stop getting paid from that day on. What day is the first day you would receive no payment and what is your total income?

[A] 17th day; \$1997.97 total income [B] 17th day; \$1997.26 total income

[C] 20th day; \$1997.97 total income [D] 13th day; \$1999.39 total income

1 day short

$y = 700(.65)^x$

day 16 → day 17

1,299.14

$\sum_{1}^{16} 700(.65)^x$

$A = P(1 \pm r)^t$

$\$1 = 700(.65)^x$

$\dfrac{1}{700} = .65^x$

$\log_{.65}\frac{1}{700} = x$

$\dfrac{\log\frac{1}{700}}{\log .65}$

$\log_3 \frac{1}{9} = \log_3 27^{9x-3}$

$\log_3 \frac{1}{9} = (9x-3)\log_3 27$

$-2 = (9x-3)\cdot 3$

$-2 = 27x+9$

$-11 = 27x$

21. Solve: $\frac{1}{9} = 27^{9x+3}$ [A] $-\frac{11}{27}$ [B] $-\frac{7}{27}$ [C] $-\frac{5}{27}$ [D] $-\frac{5}{9}$

22. Evaluate the expression using a calculator. Round the result to three decimal places when appropriate. $\sqrt[3]{135}$

[A] $3\sqrt[3]{5}$ [B] $3\sqrt[3]{15}$ [C] $9\sqrt[3]{15}$ [D] $5\sqrt[3]{3}$

23. Find an equation for the inverse of the relation $y = 5x-4$. $x = 5y-4$ $\frac{x+4}{5}$

[A] $y = \frac{x+4}{5}$ [B] $y = -4x+5$ [C] $y = \frac{5x+4}{5}$ [D] $y = \frac{x-4}{5}$

24. Factor: $4y^2 - 25$ $(2y+5)(2y-5)$

[A] $(2y-5)(2y-5)$ [B] $(2y+5)(2y+5)$

[C] $(2y+5)(2y-5)$ [D] $(4y+1)(y-25)$

25. Divide: $(e^3-64) \div (e-4)$ $\frac{\cancel{(e-4)}(e^2+4x+16)}{\cancel{(e-4)}}$

[A] e^2+16 [B] $e^2-4e+16$ [C] $e^2+4e+16$ [D] e^2-16

26. Sara bought 6 fish. Every month the number of fish she has doubles. After m months she will have F fish, where $F = 6\cdot 2^m$. How many fish will Sara have after 2 months if she keeps all of them and the fish stay healthy?

[A] 10 [B] 20 [C] 144 [D] 24

27. The volume of a sphere can be given by the formula $V = 4.18879r^3$. You have to design a spherical container that will hold a volume of 85 cubic inches. What should the radius of your container be?

$85 = 4.18879r^3$

[A] 20.29 in. [B] 4.5 in. [C] 2.62 in. [D] 2.73 in.

28. Use the formula $R = \log_{10} I$, where R is the measurement of the Richter scale and I is the intensity, to find the Richter scale measurement of an earthquake with intensity 20,000,000.

[A] 16.8112 [B] 1.68112 [C] 7.301 [D] 0.7301

$R = \log_{10} 20\,000\,000$

29. For 1985 through 1996, the number, C (in thousands), of videos rented each year in Moose Jaw can be modeled by $C = 0.039(t^3 + 2t^2 + 30t + 500)$, where $t = 0$ represents 1990. During which year are 64.8 thousand movies projected to be rented? table

yr: 9

[A] 1998 [B] 2002 [C] 2004 [D] 1999

30. Solve: $x^3 - 3x^2 = 0$ [A] 0, –3 [B] 3, –3 [C] 0, 3 [D] 3, –4

$x^2(x-3)$

0 3

31. In 1991, the population of a country was estimated at 4 million. For any subsequent year the population, $P(t)$ (in millions), can be modeled by the equation $P(t) = \dfrac{240}{5 + 54.99e^{-0.0208t}}$, where t is the number of years since 1991. Use a graphing calculator to estimate the year when the population will be 20 million.

ok

table

yr: 100

[A] approximately the year 2040

[B] approximately the year 2095

[C] approximately the year 2090

[D] approximately the year 2017

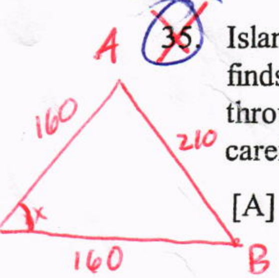
32. The amount of money, A, accrued at the end of n years when a certain amount, P, is invested at a compound annual rate, r, is given by $A = P(1+r)^n$. If a person invests \$220 in an account that pays 4% interest compounded annually, find the balance after 5 years.

[A] \$268 [B] \$5500 [C] \$1183 [D] \$1100

33. Evaluate: $\log_3 81$ [A] $\frac{1}{4}$ [B] $\frac{1}{12}$ [C] 4 [D] 12

34. Simplify: $27^{4/3}$ [A] 36 [B] 27 [C] $\frac{1}{3}$ [D] 81

ok



35. Island A is 210 miles from island B. A ship captain travels 160 miles from island A and then finds that he is off course and 160 miles from island B. What angle, in degrees, must he turn through to head straight for island B? Round the answer to two decimal places. (Hint: Be careful to properly identify which angle is the turning angle.)

[A] 7.97° [B] 82.03° [C] 97.97° [D] 15.94°

$210^2 = 160^2 + 160^2 - 2 \cdot 160 \cdot 160 \cos x$

$44100 = 51200 - 51200 \cos x$

$x = 82$

but turning angle is 180-82

36. Expand using the properties of logarithms: $\log_a \dfrac{4xy^3}{z^2}$

[A] $\log_a 4 + \log_a x + 3\log_a y - 2\log_a z$

[B] $12 + \log_a xy - 2\log_a z$

[C] $\dfrac{\log_a 4 + \log_a x + 3\log_a y}{2\log_a z}$

[D] $4 + \log_a x + 3\log_a y - 2\log_a z$

37. If there are initially 3000 bacteria in a culture, and the number of bacteria double each hour, the number of bacteria after t hours can be found using the formula $N = 3000(2^t)$. How many bacteria will be present after 3 hours?

[A] 12,000 [B] 48,000 [C] 18,000 [D] 24,000

38. Solve the equation. Check for extraneous solutions. $\sqrt{x + 42} = x$

[A] 7 [B] no solution [C] 7, –6 [D] –6

$x+42=x^2$

$x^2-x-42=0$

$(x-7)(x+6)$

$7 \quad \cancel{-6}$

9

extraneous

$\sqrt{36} \neq -6$

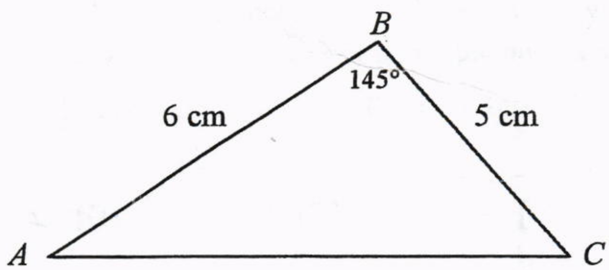
39. The velocity of sound in air is given by the equation $v = 20\sqrt{273 + t}$ where v is the velocity in meters per second and t is the temperature in degrees Celsius. Find the temperature when the velocity of sound in air is 316 meters per second. Round the answer to the nearest degree.

$316 = 20\sqrt{73+t}$

-23.36

[A] none of these [B] –2°C [C] 9°C [D] –16°C

40. Find the area of ΔABC. The figure is not drawn to scale.



$\frac{1}{2} a b \sin C$

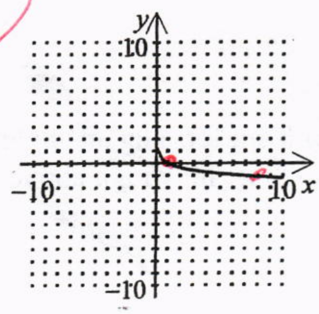
$\frac{1}{2} \cdot 6 \cdot 5 \sin 145$

[A] 7.27 cm^2 [B] 8.60 cm^2 [C] 15.0 cm^2 [D] 6.38 cm^2

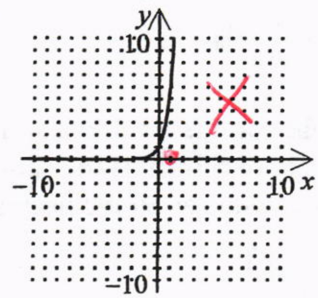
1, 0
7, −1
49 −2

~~41.~~ Graph: $y=\log_{1/7} x$

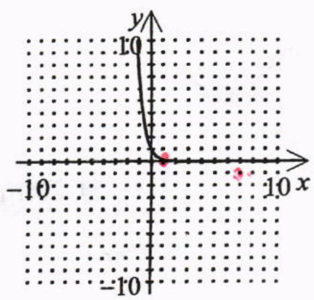
[A]



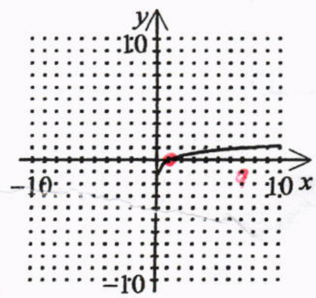
[B]



[C]



[D]



$2x+18+2x-6$
$4x+12$

42. The sides of a rectangle have lengths $x+9$ and widths $x-3$. Which equation below describes the perimeter, P, of the rectangle in terms of x?

[A] $P = 2x+6$ [B] $P = x+6$ [C] $P = x^2+6x-27$ [D] $P = 4x+12$

43. The number of bacteria present in a culture after t minutes is given as $B = 10e^{kt}$. If there are 2624 bacteria present after 6 minutes, find k. $2624 = 10e^{k\cdot 6}$

$262.4 = e^{6k}$
$\ln 262.4 = 6k$
$\frac{\ln 262.4}{6} = k$

[A] 33.419 [B] 0.928 [C] 1.114 [D] 5.57

44. If \$2000 is invested at a rate of 5% compounded continuously, find the balance in the account after 7 years. Use the formula $A=Pe^{rt}$.

[A] \$2814.20 [B] \$2838.14 [C] \$14778.11 [D] \$2983.65

45. Write the following using radical notation. Assume that all variables represent positive real numbers. $2x^{7/11}$ $2\sqrt[11]{x^7}$

[A] $2\sqrt[7]{x^{11}}$ [B] $2\sqrt[11]{x^7}$ [C] $\sqrt[11]{(2x)^7}$ [D] $\sqrt[7]{(2x)^{11}}$

46. Find the sum of the first 20 terms of the arithmetic sequence, if the first term is 5 and the common difference is −2.

[A] −280 [B] 56 [C] −560 [D] −330

$\frac{20(5+-33)}{2}$

~~$t_n = -2+5(n-1)$~~ $t_n = 5+-2(n-1)$

~~$t_{20} = 93$~~ $t_{20} = -33$

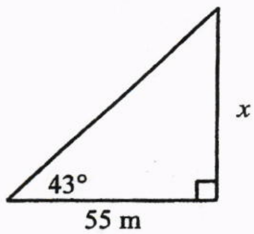
47. Factor completely: $3x^3 + 6x^2 + 12x$

$x(3x^2+6x+12)$
$3x(x^2+2x+4)$

[A] $x(3x^2 + 6x + 12)$ [B] $3x(x+2)(x+4)$

[C] $3(x^3 + 2x^2 + 4x)$ [D] $3x(x^2 + 2x + 4)$

48. A photographer points a camera at a window in a nearby building forming an angle of 43° with the camera platform. If the camera is 55 m from the building, how high above the platform is the window, to the nearest hundredth?

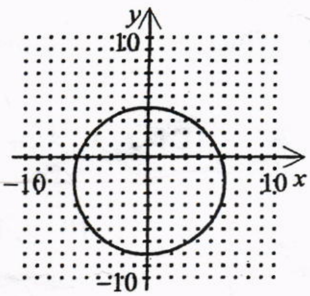


$\tan 43 = \frac{x}{55}$
51.29

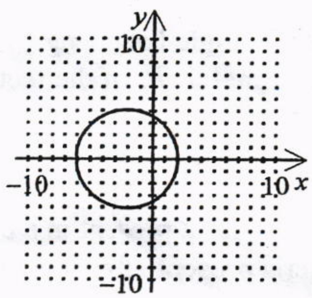
[A] 58.98 m [B] 1.07 m [C] 0.93 m [D] 51.29 m

49. Graph: $x^2 + y^2 = 36$

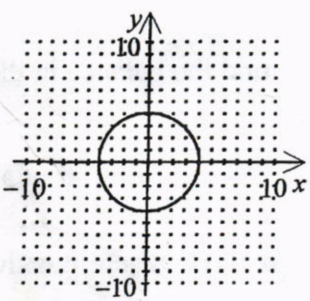
[A]



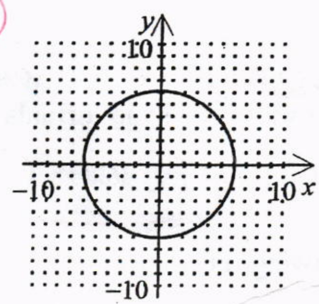
[B]



[C]



[D]



50. Write the standard form of the equation of the circle with radius 6 and center at (0, 0).

[A] $x^2 + y^2 = 36$ [B] $\frac{x^2}{12} + \frac{x^2}{12} = 1$ [C] $x^2 + y^2 = 12$ [D] $x^2 + y^2 = 6$