Quarter 3 Review

Name: KEY

Date: _____ Class: _____

Find the stated term for the following sequences

1. -3, -6, -12, -24, ...; 9th term geometric $r=2$

$f(n)=-3(2)^{n-1}$

$f(9)=-3(2)^{8}$

$=-768$

2. 4, -12, 36, -108, ...; 11th term geometric $r=-3$

$f(n)=4(-3)^{n-1}$

$f(11)=4(-3)^{10}$

$=236,196$

Find the sum of the geometric series.

3. 4 + 16 + 64 + 256 + ... + 16,384 geometric $r=4$ $n=7$

$\frac{4(1-4^n)}{1-4}$

$\frac{4(1-4^7)}{-3}=21,844$

4. 3 - 6 + 12 - 24 + ... - 1536 geometric $r=-2$ $n=10$

$\frac{3(1-(-2)^n)}{1-(-2)}$

$\frac{3(1-(-2)^{10})}{3}=-1023$

$-\frac{1536}{3}=\frac{3(-2)^{n-1}}{3}$

$-512=(-2)^{n-1}$

$-2^9=(-2)^{n-1}$

$9=n$

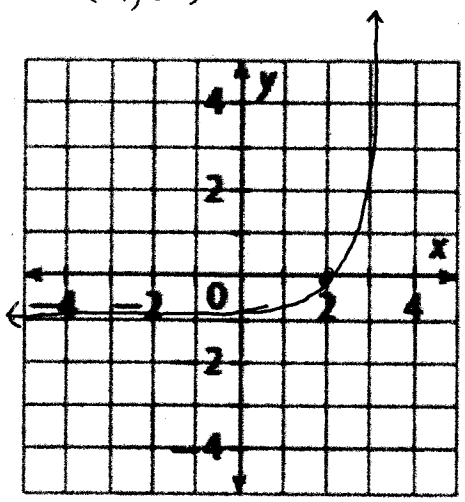
$n=10$

Find the domain and range and graph each of the following functions

5. $f(x)=3^{x-2}-1$

D: $(-\infty,\infty)$

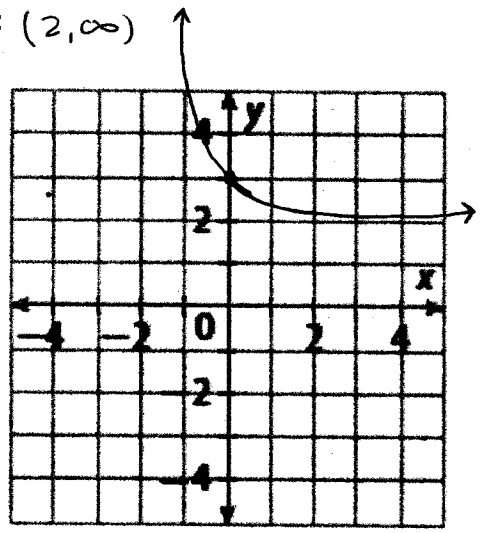
R: $(-1,\infty)$



6. $f(x)=\left(\frac{1}{3}\right)^x+2$

D: $(-\infty,\infty)$

R: $(2,\infty)$



7. A melting snowman is losing one-half of his weight each day. He originally weighed 128 pounds. Assuming that the outside temperature stays the same, how much does the snowman weigh after 5 days?

$128\left(\frac{1}{2}\right)^{n-1}$ = 8 lbs

8. A car with a cost of \$25,000 is decreasing in value at a rate of 10% each year. The function $g(t) = 25{,}000(0.9)^t$ gives the value of the car after t years. When will the value of the car be about \$12,000?

$\frac{12{,}000}{25{,}000} = \frac{25{,}000}{25{,}000}(0.9)^t$ $\quad .48 = 0.9^t$ $\quad t = \frac{\log 0.48}{\log 0.9}$ $\quad$ **t=6.97 years**

$\log_{0.9} 0.48 = t$

Write the following in exponential or logarithmic form

9. $4^2 = 16$ **$\log_4 16 = 2$**

10. $e^{17} = a$ **$\ln a = 17$**

11. $\log_7 x = 10$ **$7^{10} = x$**

12. $\ln x = 32$ **$e^{32} = x$**

Evaluate the following

13. $\log_{12} 12^{15}$ **15**

14. $\ln e^{32}$ **32**

15. $10^{\log 14}$ **14**

16. $\log_5 \sqrt{5}$ **$\frac{1}{2}$**

Write each as a single logarithm. Assume that all variables are positive.

17. $\frac{1}{3}\log_7 y - 6\log_7 z$

$\log_7 \sqrt[3]{y} - \log_7 z^6$

$\log_7 \left(\frac{\sqrt[3]{y}}{z^6}\right)$

18. $3\log_2 x + \frac{1}{2}\log_2 y - 2\log(xz)$

$\log_2 x^3 + \log_2 \sqrt{y} - \log (xz)^2$

$\log_2 x^3\sqrt{y} - \log (xz)^2$

Use the properties of logarithms to expand the following. Express all exponents as coefficients.

19. $\log_3 x^2 y^4$

$\log_3 x^2 + \log_3 y^4$

$2\log_3 + 4\log_3 y$

20. $\log_{12} \frac{\sqrt{x}}{y^2}$

$\log_{12} \sqrt{x} - \log_{12} y^2$

$\frac{1}{2}\log_{12} - 2\log_{12}$

21. $\log_4 \frac{x\sqrt{y}}{z^{12}w^2}$

$\log_4 x\sqrt{y} - \log_4 z^{12} w^2$

$\log_4 x + \frac{1}{2}\log_4 y - 12\log_4 z + 2\log_4$

Solve the following. Round your answer to the nearest hundredth. Check for extraneous solutions.

22. $4^{2x+10} + 6 = 262$

$-6 \quad -6$

$4^{2x+10} = 256$

$\log_4 256 = 2x + 10$

x = -3

$-10 + \frac{\log 256}{\log 4} = 2x + 10$

$\frac{1}{2} - 10$

23. $\frac{1}{7}e^{\frac{x}{4}} = \frac{500}{7}$

$e^{\frac{x}{4}} = 71.43$

$4 \cdot \ln 71.43 = \frac{x}{4} \cdot 4$

x = 17.07

24. $\log_2 x - \log_2 3 = 4$

$\log_2\left(\frac{x}{3}\right) = 4$

$2^4 = \frac{x}{3}$

$x = 48$

25. $\ln(x+2) + \ln(x+3) = \ln 30$

$\ln(x+2)(x+3) = \ln 30$

$\ln(x^2+5x+6) = \ln 30$

$x^2+5x+6 = 30$

$-30 \quad -30$

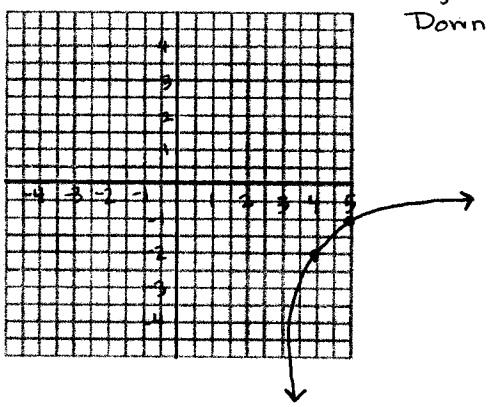
$x^2+5x-24 = 0$

$(x+8)(x-3) = 0$

$x = -8, 3$

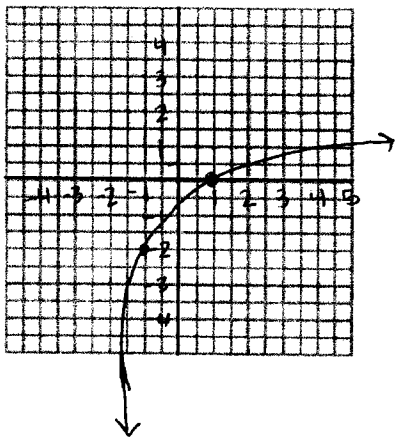
26. $f(x) = \log_2(x-3) - 2$ (1,0) (2,1)

Right 3
Down 2



27. $f(x) = 2\log_3(x+2) + 2$ (1,0) (3,1)

Left 2
Up 2
V.S. of 2



Evaluate the following for θ

28. $\cos\theta = -\frac{\sqrt{2}}{2}; 0 \le \theta \le \pi$

$\frac{3\pi}{4}$

$\cos: -\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$

29. $\sec\theta = -\sqrt{2}; \pi \le \theta \le 2\pi$

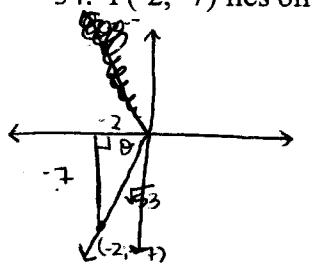
$\frac{5\pi}{4}$

Evaluate the following without a calculator

30. $\csc\frac{5\pi}{4}$ 31. $\cos\frac{11\pi}{6}$ 32. $\sin\frac{3\pi}{2}$ 33. $\cot\frac{\pi}{3}$

-1

34. P(-2, -7) lies on the terminal side of an angle of rotation θ, find cscθ.



$(-2)^2 + (-7)^2 = x^2$

$4 + 49 = x^2$

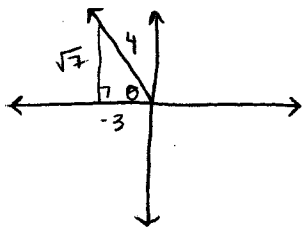
$\sqrt{53} = \sqrt{x^2}$

$x = \sqrt{53}$

$\sin\theta = -\frac{7}{\sqrt{53}}$

$\csc\theta = -\frac{\sqrt{53}}{7}$

35. Given that an angle of rotation θ is in quadrant II and $\cos\theta = -\frac{3}{4}$ (adj/hyp), find cotθ.



$(-3)^2 + x^2 = 4^2$

$9 + x^2 = 16$

$-9 \quad -9$

$\sqrt{x^2} = \sqrt{7}$

$\tan\theta = \frac{\sqrt{7}}{-3}$

$\cot\theta = -\frac{3}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$

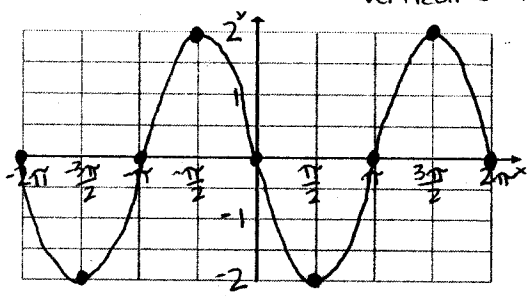
$\cot\theta = -\frac{3\sqrt{7}}{7}$

State the amplitude, phase shift, period, and vertical shift of each of the following and graph

$\frac{2\pi}{\frac{\pi}{2}} \times \frac{2}{\pi}$

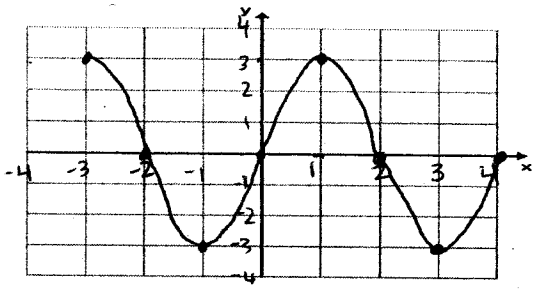
36. $f(x) = -2\sin(\theta)$

Amplitude: 2
Phase Shift: NA
Period: 2π
Vertical Shift: NA



37. $f(x) = 3\cos\left(\frac{\pi}{2}(\theta - 1)\right)$

Amplitude: 3
Phase Shift: Right 1
Period: 4
Vertical Shift: NA



Convert the following into radians or degrees.

38. $320° \times \frac{\pi}{180}$

$\frac{16\pi}{9}$

39. $-20° \times \frac{\pi}{180}$

$\frac{-\pi}{9}$

40. $132° \times \frac{\pi}{180}$

$\frac{11\pi}{15}$

41. $\frac{2\pi}{7} \times \frac{180}{\pi}$

51.4°

42. $-\frac{\pi}{5} \times \frac{180}{\pi}$

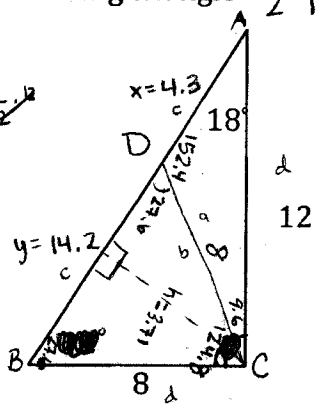
-36°

43. $\frac{3\pi}{2} \times \frac{180}{\pi}$

270°

Solve the following triangle 2 Triangles

44.



12. $\sin 18° = \frac{h}{12}$

$h = 3.708$

$\sin B = \frac{3.708}{8}$

$\sin B = 0.4635$

$B = 27.6°$

$\frac{\sin 18°}{8} = \frac{\sin 9.6°}{x}$

$x = \frac{8\sin 9.6°}{\sin 18°}$

$x = 4.317$

$\frac{\sin 27.6°}{8} = \frac{\sin 124.8°}{y}$

$y = \frac{8\sin 124.8°}{\sin 27.6°}$

$y = 14.179$

Triangle 1

$\angle A = 18°$
$\angle C = 9.6°$
$\angle D = 152.4°$
$a = 8$
$c = 4.3$
$d = 12$

Triangle 2

$\angle B = 27.6°$
$\angle D = 27.6°$
$\angle C = 124.8°$
$b = 8$
$d = 8$
$c = 14.2$