PreCalculus **Name_____**

Midterm Exam Review **Date_____Block_____**

Chapters 2/7

1. Find the following parts of the function: domain, *x*-intercept, *y*-intercept, vertical asymptote(s), horizontal asymptote(s), and/or slant asymptote(s). Domain can just show restrictions (also identify any holes), axis intercepts are points, and asymptotes are equations for *x* and *y*. State NONE if the value does not exist.

a.) $f(x) = \dfrac{x-3}{x^2-3x-4}$

Domain: _____

x-intercept(s): _____

y-intercept(s): _____

H.A.: _____

V.A.: _____

S.A.:_____

Hole(s): _____

b.) $f(x) = \dfrac{x^2-1}{x^2-2x-3}$

Domain: _____

x-intercept(s): _____

y-intercept(s): _____

H.A.: _____

V.A.: _____

S.A.:_____

Hole(s): _____

c.) $f(x) = \dfrac{x^2-x-2}{x-1}$

Domain: _____

x-intercept(s): _____

y-intercept(s): _____

H.A.: _____

V.A.: _____

S.A.:_____

Hole(s): _____

d.) $f(x) = \dfrac{2x+5}{x+1}$

Domain: _____

x-intercept(s): _____

y-intercept(s): _____

H.A.: _____

V.A.: _____

S.A.:_____

Hole(s): _____

In 2 - 3, find the partial fraction decomposition of each.

2. $\dfrac{-5x+4}{x^2-x}$

3. $\dfrac{-7x-15}{x^2+6x+9}$

Chapter 3

In 4 - 6, evaluate each expression WITHOUT A CALCULATOR.

4. $\dfrac{\log_{12} 12^{36}}{\log_4 4^{18}}$

5. $\ln e^{5a}$

6. $\log_4 320 - \log_4 5$

7. Use the change of base formula to evaluate: $\log_5 7$

8. Use the properties of logarithms to expand: $\ln \dfrac{\sqrt{x^3 y^2}}{z}$.

9. Use the properties of logarithms to expression the following expression as a single logarithm:

$$3\ln(x-2) + 2\ln(x+2)$$

In 10 - 12, solve each equation algebraically. When necessary, round your result to the nearest thousandth.

10. $3^{2x} - 5 = 9$

11. $3 + \log_2 3x = 5$

12. $\log(x) + \log(x-21) = 2$

13. The number of bacteria present in culture $\boldsymbol{N(t)}$ at time t hours is given by $N(t) = 3000(2)^t$.

a. What is the initial population?

b. How much bacteria are present after 24 hours?

c. How long will it take the population to triple in size?

14. The number of students infected with flu after t days at Washington High School is modeled by the following function: $P(t) = \dfrac{1600}{1 + 99e^{-0.4t}}$

a. What was the initial number of infected students?

b. After 5 days, how many students will be infected?

c. What is the maximum number of students that will be infected?

15. The number of bacteria in a cup of water is modeled by a logistic curve. The limit to growth of the bacteria is 3500. The initial bacteria count is 100. After 3 hours, the bacteria count rises to 1450. Write the logistic function of the bacteria count.

Chapter 4, Part I

16. Convert the angle measure from degrees to radians.

a.) -270° b.) 144°

17. Convert the angle measure from radians to degrees.

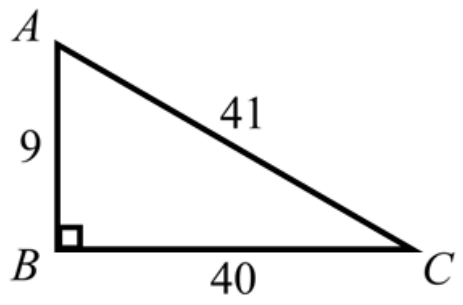
a.) $\dfrac{7\pi}{3}$ b.) $\dfrac{-13\pi}{60}$

18. a.) If the Earth rotates once every 24 hours, find the angular speed in radians/hour.

b.) If a fan rotates 30 times in a minute, find the angular speed in radians/hour.

c.) If a ferris wheel rotates 4 times per minute, find the angular speed in radians/second.

19. Find the six trigonometric ratios of $\angle A$.



20. Given $\sin\theta = \frac{4}{5}$ in Quadrant I, find the remaining 5 trig ratios.

21. Given $\csc\theta = \frac{17}{4}$ in Quadrant I, find the remaining 5 trig ratios.

22. Use a calculator to evaluate each function.

a.) $\sin 41^\circ$ b.) $\cot 71.5^\circ$ c.) $\cot\frac{\pi}{16}$ d.) $\tan\frac{\pi}{8}$

23. John wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is 33º. How tall is the tree?

24. A bird sits on top of a lamppost. The angle of depression from the bird to the feet of an observer standing away from the lamppost is 35°. The distance from the bird to the observer is 25 meters. How tall is the lamppost?

25. Determine two co-terminal angles (one positive and one negative) for each angle.

a.) $\theta = 52^\circ$

b.) $\theta = \frac{7\pi}{8}$

26. Find the indicated trigonometric value in the specified quadrant.

a.) $\sec\theta = -\frac{9}{4}; \quad QIII; \quad \tan\theta$

b.) $\cot\theta = -3; \quad QII; \quad \sin\theta$

Chapter 4, Part II

27. Find the period and amplitude.

a.) $y = 3\sin 2x$

b.) $y = \frac{2}{3}\sin \pi x$

c.) $y = \frac{3}{4}\cos\frac{\pi}{12}x$

28. Identify the transformation from f to g.

a.) $f(x) = \sin x$
$g(x) = -4\sin x$

b.) $f(x) = \cos x$
$g(x) = -\cos(x - \pi)$

c.) $f(x) = 4\sin \pi x$
$g(x) = 4\sin \pi x - 2$

29. Find the max and min.

a.) $y = 3\sin x$

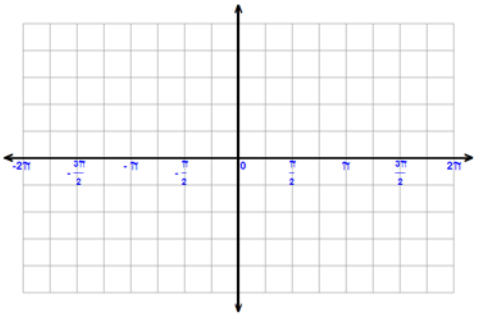
b.) $y = \frac{1}{2}\sin(x - \pi)$

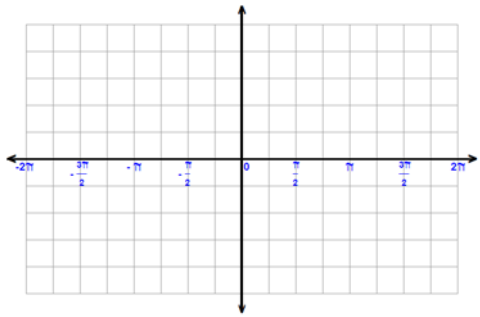
30. Graph the following:

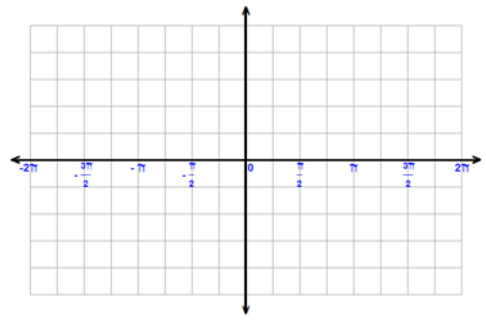
a.) $y = 3\sin 2x - 1$

b.) $y = -\cos(2x + \pi)$

c.) $y = \tan x$







31. Find the exact value of the expression.

a.) $\sin\left(\arctan\frac{4}{3}\right)$

b.) $\cos\left(\arcsin\frac{24}{25}\right)$

c.) $\sec\left(\arctan\left(-\frac{3}{5}\right)\right)$

32. Find the exact value of y without a calculator.

a.) $y = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

b.) $y = \arctan(1)$

Chapter 5

33. Simplify the expression: $\cos\theta - \cos\theta\sin^2\theta$.

34. Simplify the expression: $\dfrac{\cos^2 x + \sin^2 x}{\cot^2 x - \csc^2 x}$.

35. Simplify the expression: $\cos x + \sin x \tan x$.

36. Factor: $\sin^2 x + \sin x - 2$.

37. Simplify the expression: $\dfrac{\sin^2 x - 1}{1 + \sin x}$.