

| |
|-------------------------------------------------------------|
| Answer each non-graph question neatly on the line provided. |
|-------------------------------------------------------------|

Name: _____

1. (5 points) Find the range of $f(x) = -x^2 - 6x$. Express your answer in interval notation.

1. _____

2. (5 points) Find the maximum or minimum value of $f(x) = x^2 - 6x + 3$.

2. _____

3. (5 points) Evaluate $\log_3\left(\frac{1}{\sqrt{3}}\right)$.

3. _____

4. (5 points) True or False: $\frac{\log A}{\log B} = \log A - \log B$ for every $A > 0$ and $B > 0$.

4. _____

5. (5 points) Evaluate $\log_2(144) - \log_2(18)$. Simplify your answer completely.

5. _____

6. (5 points) Solve $1 + \log_3(x + 1) = -3$ for x .

6. _____

7. (5 points) Solve $\frac{10}{1+e^{-x}} = 2$ for x . You may leave \ln in your answer.

7. _____

8. (5 points) This question uses the population growth model. A culture of bacteria starts at 4000 bacteria. After one hour the count is 5000. How many hours will the number of bacteria double?

8. _____

9. (5 points) Evaluate $\tan\left(-\frac{5\pi}{6}\right)$.

9. _____

10. (5 points) Find the terminal point on the unit circle determined by $t = \frac{-3\pi}{4}$.

10. _____

11. (5 points) Find the degree measure of the angle $-\frac{5\pi}{2}$ radians.

11. _____

12. (5 points) Find $\tan \theta$ if $\sin \theta = -\frac{12}{13}$ and θ is in quadrant IV.

12. _____

13. (5 points) The point P is on the unit circle, the x -coordinate of P is $-\frac{2}{7}$, and P is in quadrant II. Find the point $P(x, y)$.

13. _____

14. (5 points) Find an angle between 0 and 2π that is coterminal with $\frac{51\pi}{2}$.

14. _____

15. (5 points) Find the length of the arc that subtends a central angle of measure $\frac{3\pi}{4}$ in a circle of radius 10 cm.

15. _____

16. (5 points) Evaluate $\cos(-150^\circ)$.

16. _____

17. (5 points) Sketch the graph $y = \log_6(x + 1)$ not by plotting points but by transforming a known graph. Label all intercepts and asymptotes on your sketch. State the domain and range using interval notation.

18. (5 points) Sketch the graph $y = 4 + \left(\frac{1}{3}\right)^x$ not by plotting points but by transforming a known graph. Label all intercepts and asymptotes on your sketch. State the domain and range using interval notation.

19. (5 points) Sketch the graph $f(x) = -x^4 + 9x^2$. Label all intercepts on your sketch and describe its end behavior

20. (5 points) Sketch the graph $y = \sin(\frac{1}{2}x) + 3$. Find the amplitude, period, phase shift, and midline. Label two points on your graph: one maximum point, one minimum point.