

The following multiple choice questions are worth 5 points each.

1. Evaluate: $\log_3 \frac{1}{27}$

a. $\frac{1}{3}$

b. -9

c. 3

d. -3

e. None of the above

2. Write as a sum, difference, and/or product of logarithms.

$$\log_7 \frac{16\sqrt{r}}{s}$$

a. $\frac{(\log_7 16)\sqrt{r}}{\log_7 s}$

b. $\log_7 16 + \log_7 r - \log_7 s$

c. $\log_7 16 + \frac{1}{2} \log_7 r - \log_7 s$

d. $\frac{(\log_7 16)(\log_7 \sqrt{r})}{\log_7 s}$

e. None of the above

3. Rewrite the following expression as a single logarithm. Assume that all variables represent positive real numbers.

$$6 \log_m p - 4 \log_m z^2$$

a. $\log_m \frac{p^6}{z^8}$

b. $\frac{\log_m p^6}{\log_m z^8}$

c. $\log_m \frac{p}{2z^4}$

d. $\log_m \frac{6p}{4z^2}$

e. $2 \log_m (3p - 2z^2)$

8. Find the angle of smallest positive measure coterminal with $-\frac{P}{3}$.

a. $\frac{5P}{3}$

c. $\frac{2P}{3}$

b. $\frac{P}{3}$

d. $-\frac{3}{P}$

9. Suppose that P is a point on the unit circle and that s is the arc from $(1, 0)$ to P .

If the coordinates of the point P are $\left(\frac{-3}{5}, \frac{4}{5}\right)$, which of the following is/are correct?

I. $\sin s = -\frac{3}{5}$

II. $\cos s = \frac{4}{5}$

III. $\tan s = -\frac{4}{3}$.

a. Only I is correct.

c. Only III is correct

b. Only II is correct.

d. I, II and III are all correct.

10. Find the value of $\tan \frac{17P}{3}$.

a. $-\sqrt{3}$

c. $\sqrt{3}$

b. $\frac{\sqrt{3}}{3}$

d. $\frac{\sqrt{2}}{2}$

11. Suppose the point (x, y) is in quadrant IV. The ratio $\frac{x}{y}$ is:

a. positive

c. undefined

b. negative

d. There is insufficient information to make a determination.

12. Given that $\sin \mathbf{b} = \frac{7}{25}$ and $\frac{\mathbf{p}}{2} < \mathbf{b} < \mathbf{p}$.

Which of the following is/are correct?

I. $\cot \mathbf{b} = -\frac{24}{7}$

II. $\csc \mathbf{b} = \frac{25}{7}$

III. $\cos \mathbf{b} = \frac{24}{25}$

a. Only I is correct.

b. Only II is correct.

c. Only I and II are correct.

d. I, II, and III are all correct.

13. Find $\tan \forall$ if $\cos \forall = \frac{1}{4}$, with \forall in quadrant IV.

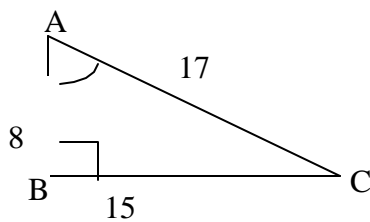
a. $\tan \forall = \frac{3}{4}$

b. $\tan \forall = \frac{-1}{4}$

c. $\tan \forall = \frac{-\sqrt{15}}{4}$

d. $\tan \forall = -\sqrt{15}$

14. Find the exact value of $\cot A$



a. $\cot A = \frac{8}{15}$

b. $\cot A = \frac{15}{8}$

c. $\cot A = \frac{17}{8}$

d. $\cot A = \frac{8}{17}$

Name: _____

Section: _____

Instructor: _____

The following questions are free response. Please show all work in order to receive credit.

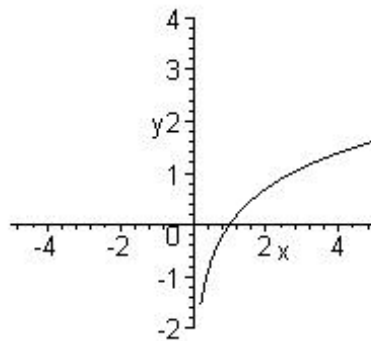
15. Assume $a > 1$, and answer each of the following as True or False in sequential order:

I. The inverse of $f(x) = a^x$ is $f^{-1}(x) = \log_a x$. _____

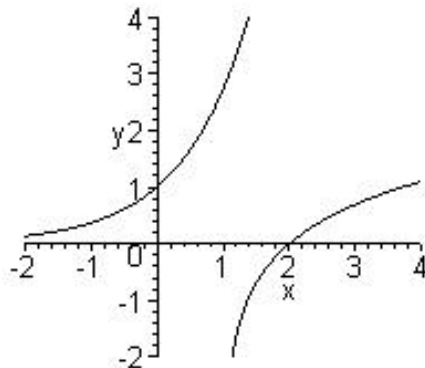
II. If $a = e$, $f^{-1}(x) = \ln x$ _____

III. If $a = 10$, $f^{-1}(x) = \log 10$ _____

IV. Given below is the graph of $f(x) = a^x$ _____



V. Given below are the graphs of f and f^{-1} . _____



16. Suppose animal remains are discovered in which the amount of Carbon-14 present is only about one-fifth the amount found in living tissue. About how long ago did the animal die?

(The formula for the decay of carbon-14 is $A(t) = A_0 e^{-0.0001216t}$, with t measured in years.)

17. Consider the equation $y = -2x$, $x \geq 0$. The equation describes the terminal side of an angle \mathbf{q} in standard position. Sketch the smallest positive such angle \mathbf{q} , and find the following:

i. $\sin \mathbf{q} =$

ii. $\cos \mathbf{q} =$

iii. $\tan \mathbf{q} =$

