

Math 1150
Autumn 2012
Midterm 2
Form A

Name: _____
OSU user name (name.nn): _____
Recitation Instructor: _____
Recitation Time: _____

The point value of each problem is indicated. To obtain full credit you must have the correct answers along with **the supporting work**. Answers without supporting work will receive no credit, except for multiple choice problems. **CIRCLE YOUR ANSWERS.**

1. (20 points) Multiple Choice: **Circle your answer.**

(a) Express the equation $3^x = 7$ in logarithmic form.

- (i) $\log_3(x) = 7$ (ii) $\log_x(7) = 3$ (iii) $\log_3(7) = x$ (iv) Not listed

(b) The domain of the function defined by $f(x) = \log_5(x^2 - 3x)$ is:

- (i) $(3, \infty)$ (ii) $(-\infty, 0) \cup (3, \infty)$ (iii) Not listed

(c) The statement $\log_3(a + b) = \log_3(a) + \log_3(b)$ for all $a, b > 0$ is:

- (i) True (ii) False

(d) Expand $\ln(7e^x)$.

- (i) $7x$ (ii) $7 + x$ (iii) $\ln(7) + x$ (iv) Not listed

(e) Use the Laws of Logarithms to combine the expression $\frac{3}{2} \log(x^2 + 5) - \log(x + 3)$.

- (i) $\log\left(\frac{\frac{3}{2}(x^2 + 5)}{x + 3}\right)$ (ii) $\log\left(\frac{(x^2 + 5)^{\frac{3}{2}}}{x + 3}\right)$ (iii) Not listed

2. (20 points)

(a) The function $f(x) = x^3 \cos(x)$ is:

(i) Even

(ii) Odd

(iii) Neither

(b) Use the change of base formula to write $\log_5(x)$ in terms of $\ln(x)$.

(i) $\ln \frac{x}{5}$

(ii) $\frac{\ln x}{\ln 5}$

(iii) $\frac{\ln 5}{\ln x}$

(iv) Not listed

(c) The angles in standard position with measures $\frac{17\pi}{5}$ and $\frac{2\pi}{5}$ are coterminal.

(i) True

(ii) False

(d) The reference angle for $\frac{31\pi}{4}$ is:

(i) $-\frac{\pi}{4}$

(ii) $\frac{\pi}{4}$

(iii) $\frac{7\pi}{4}$

(iv) Not listed

(e) Simplify $\sin^{-1}(\sin \frac{5\pi}{4})$.

(i) $\frac{5\pi}{4}$

(ii) $\frac{\pi}{4}$

(iii) $-\frac{\pi}{4}$

(iv) Not listed

3. (20 points)

a) Fill in the blank.

$$\log_a(a) = \underline{\hspace{2cm}}$$

$$\log_a(1) = \underline{\hspace{2cm}}$$

$$95^\circ = \underline{\hspace{2cm}} \text{ radians. } \underline{\text{Give the exact value.}}$$

b) Solve the logarithmic equation $\log_8(x) + \log_8(x + 2) = 1$. Circle your answer.

c) How tall is a building if the angle of elevation from the ground is 16° at a distance of 200 ft from the base of the building? Round your answer to two decimal places.

4. (20 points)

a) The doubling time of a population is 17 years.

- Write a model for the population $n(t)$ in terms of the initial population n_0 .

- How long will it take for the population to reach 10,000, if the initial population is 6,000? Round your answer to two decimal places.

b) A triangle has angles $\angle A = 25^\circ$, $\angle B = 48^\circ$, and side $b = 12$. Find side a . Round your answer to two decimal places.

c) Given $f(x) = -3 \sin\left(\frac{5}{2}x - 10\pi\right)$, fill in the blank.

Amplitude: _____

Period: _____

Phase shift: _____

An appropriate interval on which to graph one complete period: _____

5. (20 points)

(a) Solve the inequality $\frac{3(x+1)}{x} \geq \frac{1}{x}$.

(i) $[-\frac{2}{3}, \infty)$

(ii) $(-\infty, -\frac{2}{3}] \cup (0, \infty)$

(iii) Not listed

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

(i) $(\frac{1}{2}, \frac{\sqrt{3}}{2})$

(ii) $(\frac{\sqrt{3}}{2}, \frac{1}{2})$

(iii) Not listed

(c) Find $\cos \theta$ if $\tan \theta = \frac{2}{x}$ and $\sin \theta > 0$.

(i) $\frac{x}{\sqrt{4+x^2}}$

(ii) $\frac{2}{\sqrt{4+x^2}}$

(iii) $\frac{\sqrt{4+x^2}}{x}$

(iv) Not listed

(d) The area of a sector of a circle with a central angle of 30° is $36 m^2$. Find the radius of the circle.

(i) 5.86

(ii) 11.73

(iii) 1.55

(iv) Not listed