

Fall 2006

Name _____

Instructor for your Section _____ Meeting Time _____

NOTE: A calculator is required, and a notecard is allowed for this exam.**Part 1: Answer the following multiple-choice questions on the Scan Sheet. Make sure to code your name, WIN number, instructor's name, and form type on the Scan Sheet using a pencil.****(6 pts. each) You may write on this exam.**

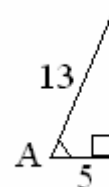
1. Solve the exponential equation $3e^{(0.1x)} = 18$ and evaluate the approximate answer to five decimal places.
 - (a) 0.07702
 - (b) 7.78151
 - (c) 17.91759
 - (d) 0.17918
 - (e) none of the above

2. Given that $\log_2 a = 3.82077$, find $\log_2 \sqrt[3]{a}$.
 - (a) 11.46231
 - (b) 1.910385
 - (c) 7.64154
 - (d) 1.27359
 - (e) none of these

3. Suppose that an accident releases a radioactive chemical in a concentration of 0.03 grams per square meter over the ground in a region. It is determined that a *safe* level for this chemical is 0.005 grams/m², and that the half-life for this radioactive material is 20 years. Approximately how long will it take for this chemical to decay to this safe level?
 - (a) less than 50 years
 - (b) 52 years
 - (c) 54 years
 - (d) 56 years
 - (e) more than 58 years

4. Evaluate the logarithmic expression: $\log_7 \sqrt{7}$.
 - (a) 0.5
 - (b) 0.4225
 - (c) 0.9730
 - (d) 2.6458
 - (e) none of these

5. Find the domain and range for the function $f(x) = 4^x$.
- (a) domain of f is $(-\infty, \infty)$; range of f is $(0, \infty)$.
 - (b) domain of f is $(-\infty, \infty)$; range of f is $(-\infty, \infty)$.
 - (c) domain of f is $(0, \infty)$; range of f is $(0, \infty)$.
 - (d) domain of f is $(0, \infty)$; range of f is $(-\infty, \infty)$.
 - (e) none of these
6. Approximate the solution of the equation $3 = x + \log_3 x$ to the nearest hundredth.
- (a) 2.21 (b) 2.59 (c) 2.16 (d) 2.26 (e) none of these
7. Convert 5π to degree measure.
- (a) 180° (b) 540° (c) 720° (d) 900° (e) none of these
8. Find the reference angle θ_R for $\theta = -\frac{13\pi}{8}$.
- (a) $\theta_R = \frac{7\pi}{8}$ (b) $\theta_R = \frac{-5\pi}{8}$ (c) $\theta_R = \frac{5\pi}{8}$ (d) $\theta_R = \frac{-3\pi}{8}$ (e) $\theta_R = \frac{3\pi}{8}$
9. Convert 345° to radian measure.
- (a) $\frac{\pi}{4}$ (b) $\frac{\pi}{12}$ (c) $\frac{5\pi}{3}$ (d) $\frac{11\pi}{6}$ (e) $\frac{23\pi}{12}$
10. Given $\cos \theta = -\frac{1}{4}$ and $\tan \theta < 0$, find $\sin \theta$.
- (a) $-\sqrt{15}$ (b) $-\frac{\sqrt{15}}{4}$ (c) $\frac{\sqrt{15}}{4}$ (d) $-\frac{3}{4}$ (e) $\frac{3}{4}$
11. Given the right triangle pictured here, find the $\sin(\angle A)$, where $\angle A$ denotes the angle at the vertex labeled A .
- (a) $\frac{5}{13}$ (b) $\frac{13}{5}$ (c) $\frac{5}{12}$ (d) $\frac{12}{13}$ (e) $\frac{13}{12}$



12. State the domain and range for the function $g(x) = \cos^{-1}(x)$.

(a) domain of g is $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$; range of g is $(-\infty, \infty)$.

(b) domain of g is $[-1, 1]$; range of g is $[0, \pi]$.

(c) domain of g is $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$; range of g is $[-1, 1]$.

(d) domain of g is $[-1, 1]$; range of g is $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$.

(e) domain of g is $(-\infty, \infty)$; range of g is $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$.

13. Find the exact value of $\tan^{-1}\left(\tan\left(\frac{2\pi}{3}\right)\right)$.

(a) $\frac{2\pi}{3}$

(b) $\frac{\pi}{3}$

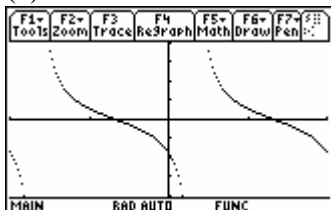
(c) $\frac{\pi}{6}$

(d) $-\frac{\pi}{3}$

(e) $-\frac{\pi}{6}$

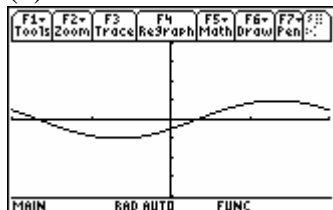
14. Which graph below is the graph of $f(x) = \csc\left(x - \frac{\pi}{6}\right)$?

(a)



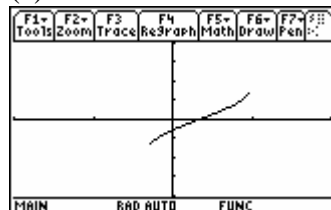
$-\pi \leq x \leq \pi, -4 \leq y \leq 4$

(b)



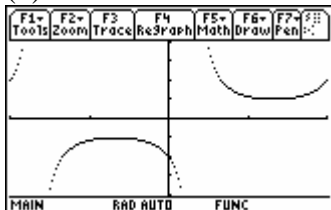
$-\pi \leq x \leq \pi, -4 \leq y \leq 4$

(c)



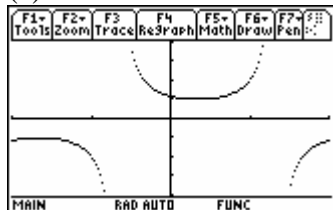
$-\pi \leq x \leq \pi, -4 \leq y \leq 4$

(d)



$-\pi \leq x \leq \pi, -4 \leq y \leq 4$

(e)



$-\pi \leq x \leq \pi, -4 \leq y \leq 4$

Part 2: SHOW YOUR WORK! Write out your solutions to the following two questions, showing clearly how you arrive at your answers. (8 pts. each)

15. Our textbook suggests that the growth of a deer population in some region might be modeled by the following logistic model:

$$P(t) = \frac{240,000}{1 + 23e^{-0.1398t}}$$

where t is measured in years and P is the number of deer.

- (a) Evaluate this model for $t = 0$, 30, and 60 years.

- (b) How many years does it take for the deer population to reach 100,00?

16. Based upon OSHA (Occupational Safety and Health Administration) standards, an extension ladder should make a 75° angle with the ground. For a 32-foot ladder, (a) how far must the base of the ladder be located away from a building to meet this standard, and (b) how high will the ladder reach along the side of a building?

Answer Key: 1. c, 2. d, 3. b, 4. a, 5. a, 6. d, 7. d, 8. e, 9. e, 10. c, 11. d, 12. b, 13. d, 14. d