

MATH 125  
SUMMER 2018  
EXAM 3

NAME:

1. 10 pts. Find the domain and range of the function:  $f(x) = 2 + 3^{x/2}$ .
2. 10 pts. Solve for  $x$ :  $(e^4)^x \cdot e^{x^2} = e^{12}$ .
3. 10 pts. Find the domain of the function

$$g(x) = \ln\left(\frac{1}{x+2}\right).$$

4. 10 pts. Solve for  $x$ :  $5e^{0.2x} = 9$ .
5. 10 pts. each The atmospheric pressure  $p$  on an object decreases with increasing altitude. Measured in millimeters of mercury (mmHg), this pressure is related to the height  $h$  (in kilometers) above sea level by the function

$$p(h) = 760e^{-0.145h}.$$

- (a) To the nearest hundredth, find the height of an aircraft if the atmospheric pressure is 320 mmHg.
  - (b) At what height is the pressure 200 mmHg?
6. 10 pts. Write as a single logarithm:

$$3 \log_2(x-3) - \log_2(2x-1) - \log_2(x+1).$$

7. 10 pts. each Solve each equation in exact form.
  - (a)  $\log_6(x+4) + \log_6(x+3) = 1$ .
  - (b)  $(3/5)^x = 7^{1-x}$ .

8. 10 pts. each Iodine-131 is a radioactive isotope that decays according to the function  $A(t) = A_0e^{-0.087t}$ , where  $A_0$  is the initial amount present and  $A(t)$  is the amount present at time  $t$  (in days).
  - (a) If there are initially 100 grams of iodine-131, how much is left after 11 days to the nearest tenth of a gram?
  - (b) What is the half-life of iodine-131 to the nearest hundredth of a day?

9. 10 pts. Convert  $210^\circ$  to radians, expressing the answer as a multiple of  $\pi$ .

10. 10 pts. An object is traveling on a circle with a radius of 2 meters. If in 20 seconds it travels 5 meters, what is its angular speed? What is its linear speed?

11. 10 pts. The terminal side of the angle  $\theta$  contains the point  $(5, -12)$ . Find the exact value of each of the six trigonometric functions of  $\theta$ .
12. 10 pts. Given that  $\sin \theta = -2/3$  and  $\pi < \theta < 3\pi/2$ , find the exact value of each of the remaining trigonometric functions of  $\theta$ .
13. 10 pts. Find the domain and range of the function  $y = -4 \sin(x/8) + 1$ .

14. 10 pts. Find the domain and range of the function

$$y = -3 \sec\left(\frac{3\pi}{2}x\right).$$

15. 10 pts. Write the equation of a sine function having amplitude 2 and period  $4\pi$ .
16. 10 pts. Write the equation of a sine function having amplitude 5, period  $\pi/2$ , and phase shift 2.