MATH 125
SPRING 2019 NAME:
EXAM 3

1. $\boxed{\text{10 pts.}}$ Find the domain and range of the function: $f(x) = 2 - 3^{x/2}$.

2. $\boxed{\text{10 pts.}}$ Solve for x: $(e^4)^x \cdot e^{x^2} = e^{12}$.

3. $\boxed{\text{10 pts.}}$ Find the domain of the function

$$g(x) = \ln\left(\frac{3}{2x-3}\right).$$

4. $\boxed{\text{10 pts.}}$ Find the exact solution to $2e^{-0.3x} = 9$.

5. $\boxed{\text{10 pts.}}$ 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

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

To the nearest hundredth, find the height of an aircraft if the atmospheric pressure is 400 mmHg.

6. $\boxed{\text{10 pts.}}$ Write as a single logarithm:

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

7. $\boxed{\text{10 pts. each}}$ Solve each equation in exact form.

   (a) $\log_6(x+4) + \log_6(x+3) = 1$.

   (b) $(3/5)^x = 7^{1-x}$.

8. $\boxed{\text{10 pts. each}}$ 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. $\boxed{\text{10 pts.}}$ Convert $140.547°$ to degree-minute-second format, rounding to the nearest second.

10. $\boxed{\text{10 pts.}}$ The terminal side of the angle θ contains the point $(5, -12)$. Find the exact value of each of the six trigonometric functions of θ.

11. $\boxed{\text{10 pts.}}$ Given that $\sin\theta = -2/3$ and $\pi < \theta < 3\pi/2$, find the exact value of each of the remaining trigonometric functions of θ.

12. $\boxed{\text{10 pts.}}$ Find the domain and range of the function $y = -4\sin(x/8) + 1$.

13. $\boxed{\text{10 pts.}}$ Find the domain and range of the function

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

14. $\boxed{\text{10 pts.}}$ Write the equation of a sine function having amplitude 6 and period $\pi/5$.