

Print and sign a brief statement stating this is your work and you used no other resource:

Name (sign): _____

Name (print): _____

Student Number: _____

Instructor's Name: _____

Class Time: _____

Problem Number	Points Possible	Points Made
??	0	
??	24	
??	14	
??	10	
??	21	
??	21	
??	10	
Total:	100	

- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- If you make use of a theorem to justify a conclusion then state the theorem used by name.
- Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.
- The total number of possible points that is assigned for each problem is shown here. The number of points for each subproblem is shown within the exam.
- Please turn off your mobile phone.
- A calculator is not necessary, but numerical answers should be given in a form that can be directly entered into a calculator.

Common identities:

$$\cos(\alpha + \beta) = \cos(\alpha)\cos(\beta) - \sin(\alpha)\sin(\beta), \quad \sin(\alpha + \beta) = \sin(\alpha)\cos(\beta) + \cos(\alpha)\sin(\beta).$$

1. Common Knowledge: Who will win the first Le Tour Femmes? (No credit for obvious answers like Lizzie Deignan.)

2. Determine all of the values of x for each question below that satisfy the given equation. If no values of x satisfy the equation provide a brief justification as to how you arrived at your conclusion.

(a)

$$e^{8x-3} = 7.$$

$$\ln(\sqrt{x+1}) = 5.$$

(b)

$$4 \cdot 3^{2x-1} = 5 \cdot 6^{x+1}$$

(c)

(a)

3. Determine the inverse of each of the following functions.

Determine the inverse of $m(x) = \ln(2x - 8) - 3$

(b)

Determine the inverse of $p(x) = \sqrt{7e^{x-3}}$

(a)

4. For each question below determine the possible values given the conditions stated.

The function

$$A(t) = 3 \cdot e^{rt}$$

is used to model the decay of a radioactive material. What are the possible values of the constant r ? Express your answer as an interval, and the value of r could be any number in the interval.

(b)

The function

$$P(t) = 3 \cdot b^t$$

is used to model the number of individuals in a growing population. What are the possible values of the constant b ? Express your answer as an interval, and the value of b could be a number in the interval.

5. The power output (Watts) of an individual from a particular species of bird depends on its mass (kg),

$$\text{Power} = 0.4 (\text{Mass})^{0.8}.$$

The surface area (m^2) of a bird also depends on its mass,

$$\text{Surface Area} = 1.4 (\text{Mass})^{0.67}.$$

- (a) If the mass of a bird is 0.3 kg, what is its power output and its surface area?

- (b) Determine the formula to obtain the mass of a bird given its power output.

- (c) Determine the formula to obtain the surface area of a bird given its power output.

7.

A graphics card will be used to run an algorithm for a calculation to verify the security of a potential crypto currency transaction. The calculation is made on a string with length n . The cost of the energy required to complete the calculation scales exponentially with n . The energy cost to check a string of length 2056 is 0.02\$, and the cost to check a string of length 8224 is 0.38\$. Your budget allows for a calculation that has an energy cost of 0.50\$. What is the highest possible value of n that can be used?

Extra space for work. **Do not detach this page.** If you want us to consider the work on this page you should print your name, instructor and class meeting time below.

Name (print): _____ Instructor (print): _____ Time: _____