

Math 1550 Final Exam Fall 2017

Work all questions completely. Show all work as described in class. Answer questions in your blue book in **ORDER**. Be neat, use proper notation, and **CIRCLE** your answers. You may leave answers as radicals or trigonometric functions if they cannot be simplified. **Write out any formulas you use**. Electronic devices are **NOT** allowed on this exam. Point values for each problem are given in the boxes in the margin.

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This exam has 15 questions, for a total of 100 points.

- 6 1. Solve $x^2 - 2x - 15 \geq 0$. Write your answer in interval notation.
- 6 2. Find the center and radius of the circle $3x^2 - 18x + 3y^2 + 24y + 12 = 0$.
- 6 3. Consider the function $f(x) = \frac{4x - 6}{x + 3}$. Give
- (a) the domain of f ;
 - (b) any intercepts;
 - (c) any vertical asymptotes of f ;
 - (d) any horizontal asymptotes of f ;
 - (e) and a sketch of the graph of f .
4. A delivery van costs 28,000 when new and is worth 17,200 after 3 years. Assuming that the depreciation is linear,
- 5 (a) find an equation that relates the value V in dollars to the age in years t ;
- 3 (b) and use part (a) to predict the value after 5 years.
- 6 5. Solve $\log_2(x + 3) + \log_2(x - 3) = 4$.
6. A rancher has 200 feet of fencing to enclose two adjacent rectangular corrals of equal size. Let x and y represent the length and width of a corral, respectively.
- 3 (a) Draw a figure that visually represents the problem.
- 5 (b) What dimensions will produce the maximum enclosed area?
- 8 7. Give **exact** values for the following expressions.
- (a) $\cos(120^\circ)$
 - (b) $\sin\left(\frac{\pi}{6}\right)$
 - (c) $\arcsin\left(-\frac{\sqrt{2}}{2}\right)$
 - (d) $\tan\left(\arccos\left(\frac{3}{5}\right)\right)$
- 6 8. If θ is an angle in the second quadrant and its tangent is $-\frac{7}{24}$, find **exact** values for the remaining five trigonometric functions.

- 6] 9. Consider the function $y = 4 \cos(x - \pi)$. Give
- (a) the period;
 - (b) any intercepts;
 - (c) the phase shift;
 - (d) and the amplitude.

- 6] 10. Find all values of x in radians, $0 \leq x < 2\pi$, that satisfy $\cos^2(x) + 4 \cos(x) + 3 = 0$.

- 6] 11. Prove the identity $\frac{\sin(\theta) + \cot(\theta)}{\cos(\theta)} = \tan(\theta) + \csc(\theta)$.

- 6] 12. Convert the point $\left(2, \frac{3\pi}{4}\right)$ from polar coordinates to rectangular coordinates.

- 8] 13. Solve the following system

$$2m + 3n = 32$$

$$5m - 2n = 4.$$

- 8] 14. Find the partial fraction decomposition for

$$\frac{3x + 8}{x^3 + 4x}.$$

15. Consider the following geometric series

$$4 + \frac{4}{3} + \frac{4}{9} + \frac{4}{27} + \dots$$

- 4] (a) Express the above geometric series using sigma notation.
- 2] (b) Determine whether the sum exists for the geometric series. Justify your answer.