

Math 1550 Final Exam Spring 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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- 6 1. Solve $(x - 3)(x + 2) \geq 0$. Write your answer in interval notation.
- 6 2. Find the center and radius of the circle $x^2 + y^2 - 5y + 6 = 0$.
- 8 3. Consider the function $f(x) = \frac{x}{x^2 - 1}$. 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 .
- 8 4. Consider the function $f(x) = 2x^4 - 8x^2$. Give
- (a) any intercepts;
 - (b) all zeros with the multiplicity;
 - (c) and a sketch of the graph of f .
5. A 1 week-old sorghum plant has an average height of 2 inches. A 4 week-old sorghum plant has an average height of 8 inches. Assuming that the growth is linear,
- 4 (a) find an equation for the height of an average sorghum plant as a function of time;
- 2 (b) and use part (a) to predict how tall a 5 week-old plant will be.
- 4 6. Describe how the graph of $4f(x - 2) + 3$ is related to the graph of $f(x)$.
- 6 7. Solve $2^{x^2+3} = 16$.
- 6 8. Solve $\log_2(x) + \log_2(x - 15) = 4$.
- 8 9. Suppose you have 100 linear feet of fence to enclose three sides of a rectangular flower bed; the fourth side is your house. Determine the dimensions that will yield the greatest area. **Draw a figure** to describe the scenario and **clearly** label the length and the width.

8] 10. Give exact values for the following

(a) $\tan(60^\circ)$ (b) $\cos\left(-\frac{3\pi}{4}\right)$
(c) $\arcsin\left(-\frac{1}{2}\right)$ (d) $\sin\left(\arctan\left(\frac{1}{3}\right)\right)$

8] 11. Find all values of x in radians, $0 \leq x < 2\pi$, that satisfy $\sin(2x) = \cos(x)$.

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

4] 13. If $\cos(x) = \frac{3}{5}$, find $\cos(2x)$.

6] 14. If θ is an angle in the fourth quadrant and $\cos(\theta) = \frac{5}{13}$, find exact values for the remaining five trigonometric functions.

15. If $\mathbf{u} = \langle 2, -3 \rangle$ and $\mathbf{v} = \langle 3, 4 \rangle$,

4] (a) find $3\mathbf{u} - \frac{1}{2}\mathbf{v}$;

4] (b) find the magnitude of \mathbf{u} ;

2] (c) and express \mathbf{v} in terms of unit vectors.

6] 16. Solve the following system

$$\begin{aligned}2m - 3n &= -2 \\4m + n &= 24.\end{aligned}$$

8] 17. Find the partial fraction decomposition for $\frac{8x - 1}{x^2 - x - 2}$.

18. 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.