Math 1550 Final Exam Fall 2018

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. The point value for each problem is boxed in the margin. This exam is* ***double sided****; be sure to turn it over.*

This exam has 14 questions, for a total of 100 points.

[8] 1. Consider the function $f(x) = \dfrac{x}{x^2 - 1}$. Give

(a) the domain of f;

(b) the range of f;

(c) any intercepts;

(d) any vertical asymptotes of f;

(e) any horizontal asymptotes of f;

(f) and a sketch of the graph of f.

[6] 2. The height (in feet) of a falling object with initial velocity of 48 ft/s^2 launched straight upward from the ground is given by $h(t) = -16t^2 + 48t$, where t is time (in seconds). What is average rate of change of the height as function of time from $t = 1$ and $t = 2$?

[6] 3. Solve $\ln(x + 8) = \ln(x) + \ln(x + 3)$.

[8] 4. Give ***exact*** values for the following expressions.

(a) $\cos(225°)$ (b) $\sec\left(-\dfrac{11\pi}{6}\right)$

(c) $\arctan\left(-\dfrac{\sqrt{3}}{3}\right)$ (d) $\tan(\arctan(17))$

[8] 5. The terminal side of an angle θ in standard position passes through the point $(-3, -5)$. Calculate the ***exact*** values for the six trigonometric functions for angle θ.

[8] 6. Consider the function $y = -3\cos(2x - \pi) + 1$. Determine

(a) the phase shift (b) the amplitude

(c) the period (d) the vertical shift

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

[8] 8. Solve the system

$$\begin{aligned} 3x - 2y &= 6 \\ 2x + 3y &= 1. \end{aligned}$$

[6] 9. Verify the identity $\cos(3x) = [1 - 4\sin^2(x)]\cos(x)$.

[8] 10. A boat's speedometer reads 35 miles per hour (which is relative to the water) and sets course due west (90° from due north). If the river is moving 12 miles per hour due north, what is the resultant (actual) velocity of the boat?

[6] 11. Express the complex number $z = \sqrt{3} - i$ in polar form.

[8] 12. Identify and sketch the conic $\dfrac{(y-2)^2}{16} - \dfrac{(x-1)^2}{9} = 1$.

[8] 13. Find the partial fraction decomposition for

$$\frac{5x + 13}{x^2 + 4x - 5}.$$

[6] 14. Write the first four terms of the sequence $\{(-1)^n n^2 + 1\}_{n=1}^{\infty}$.