Math 1550 Final Exam Spring 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. Point values for each problem are given in the boxes in the margin. This exam is* ***double sided****; be sure to turn it over.*

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

[8] 1. Consider the function $f(x) = \dfrac{3x+6}{x-2}$. Determine

(a) the domain of f;

(b) the range of f;

(c) any inteval(s) where f is positive;

(d) any interval(s) where f is negative;

(e) any intercepts;

(f) any vertical asymptotes of f;

(g) any horizontal asymptotes of f;

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

2. A flower is 18 inches high after 14 days and 32 inches high after 21 days. Assuming that the growth is linear,

[5] (a) find an equation that relates the height h in inches to the number of days t;

[3] (b) and use part (a) to predict the height after 28 days.

[6] 3. Solve $\log x = 1 - \log(x-3)$.

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

(a) $\sin(210^\circ)$ (b) $\tan\left(\dfrac{\pi}{6}\right)$ (c) $\cos(-135^\circ)$

(d) $\arcsin\left(-\dfrac{\sqrt{3}}{2}\right)$ (e) $\cos\left(\arccos\left(\dfrac{2}{3}\right)\right)$

[6] 5. If θ is an angle in the second quadrant and its sine is $\dfrac{5}{13}$, find ***exact*** values for the remaining five trigonometric functions evaluated at θ.

[6] 6. Consider the function $y = -5\sin\left(2\left(x - \dfrac{\pi}{4}\right)\right) - 1$. 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 $\sin^2(x) + \sin(x) - 2 = 0$.

[6] 8. A 14-foot ladder is leaning against a building and makes a 45° angle with the ground. How far up is the ladder on the building?

[6] 9. Prove the identity $\dfrac{\sin(\theta)}{\csc(\theta) - 1} + \dfrac{\sin(\theta)}{\csc(\theta) + 1} = 2\tan^2(\theta)$.

[8] 10. A boat's speedometer reads 25 miles per hour (which is relative to the water) and sets course due east (90° from due north). If the river is moving 10 miles per hour due north, what is the resultant (actual) velocity of the boat?

[6] 11. Given $\tan(\theta) = \dfrac{3}{4}$ and θ is in the third quadrant, compute $\sin(2\theta)$.

[8] 12. Sketch and identify the conic $4x^2 + y^2 + 16x - 60 = 0$.

[8] 13. Find the partial fraction decomposition for

$$\frac{4x - 13}{x^2 - 3x - 10}.$$

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

[4] 15. Evaluate the series $\displaystyle\sum_{i=0}^{4}(2i + 1)$.