Summer Assignment for Calculus I (M115)

1. Find the domain of $f(x) = \dfrac{x+1}{4-x^2}$.

   a. $(-\infty,-1),(-1,2),(2,\infty)$

   b. $(-\infty,-2),(-2,2),(2,\infty)$

   c. $(-\infty,-2),(2,\infty)$

   d. $(-\infty,-2),(-2,-1),(-1,2),(2,\infty)$

2. Simplify the expression $\dfrac{1}{x+y}\left(\dfrac{x}{y}+\dfrac{y}{x}\right)$.

   a. 1

   b. $\dfrac{x+y}{xy}$

   c. $\dfrac{x^2+y^2}{xy(x+y)}$

   d. $\dfrac{1}{y}+\dfrac{1}{x}$

3. Write $f(x) = x^2 - 6x + 5$ in standard form.

   a. $f(x) = (x+3)^2 - 1$

   b. $f(x) = (x-3)^2 - 4$

   c. $f(x) = \left(x+\dfrac{3}{2}\right)^2 - \dfrac{1}{4}$

   d. $f(x) = (x-4)^2 - 2$

4. Given $f(x) = 2 + x^4$ and $g(x) = \sqrt{x-4}$. Find $(f \circ g)(5)$.

   a. 1

   b. 2

   c. 3

   d. 0

5. Find all solutions of the equation $\dfrac{x+2}{x-2} = \dfrac{3x}{3x-6}$.

   a. $x = \dfrac{4}{3}, 3$

   b. No solution

   c. $x = -\dfrac{4}{3}, 2$

   d. $x = -2, 2$

6. Evaluate the expression $\log_5 625 - \log_5 125$.

   a. -3

   b. 3

   c. 1

   d. 2

7. Evaluate the expression $\log_{12} 3 + \log_{12} 48$.

   a. 4

   b. 1

   c. 3

   d. 2

8. Solve $\log(3x + 7) = 2$ for x.

   a. $x = 19$

   b. $x = 21$

   c. $x = 93$

   d. $x = 31$

9. Solve $\log x + \log(x - 3) = 1$ for x.

   a. $x = -5$

   b. $x = 5$

   c. $x = 2$

   d. $x = -2$

10. Simplify the expression $\frac{\tan(x)}{\csc(x)} + \frac{\sin(x)}{\tan(x)}$.

    a. $\sec(x)$

    b. $\csc^2(x)$

    c. $\sec^2(x)$

    d. $\cos(x)$

11. Solve $x^2 2^x - 2^x = 0$ for x.

    a. $x = \ln(2), \frac{1}{2}$

    b. $x = -1, 1$

    c. $x = -2, 2$

    d. $x = \ln(2), 1$

12. Given $\cot(x)$ is undefined and $\cos(x) > 0$, find $\csc(x)$.

    a. 1

    b. 0

    c. Undefined

    d. -1

13. Solve $e^{2x} - 3e^x + 2 = 0$ for x.

    a. $x = 0, \ln(2)$

    b. $x = 0, \ln(3)$

    c. $x = 0, \ln(5)$

    d. $x = 1, 2$

14. If $\sin(x) = \frac{\sqrt{3}}{2}$ for x in Quadrant I, find $\tan(x) + \sec(x)$.

    a. $\sqrt{3} + 2$

    b. $\sqrt{2} + 3$

    c. $\sqrt{3} + 1$

    d. $\sqrt{3} - 3$

15. Simplify the expression $\dfrac{\cos(x)\sec(x)}{\cot(x)}$.

a. $\sin(x)$

b. $\tan(x)$

c. $\cot(x)$

d. $\cos(x)$

16. Evaluate $\sin\left[\cos^{-1}\left(-\dfrac{2}{7}\right)\right]$.

a. $\dfrac{\sqrt{53}}{7}$

b. $-\dfrac{\sqrt{53}}{7}$

c. $\dfrac{3\sqrt{5}}{7}$

d. $-\dfrac{3\sqrt{5}}{7}$

17. Find all solutions in the interval $[0,2\pi)$ of $\cos^2(x)-\cos(2x)=0$.

a. $x=0,\dfrac{\pi}{2}$

b. $x=\dfrac{\pi}{2},\dfrac{3\pi}{2}$

c. $x=0,\pi$

d. $x=\pm 1$

18. Evaluate $\sin\left[\tan^{-1}\left(\dfrac{x}{5}\right)\right]$.

a. $\dfrac{\sqrt{25-x^2}}{5}$

b. $\dfrac{x}{\sqrt{x^2+25}}$

c. $\dfrac{x}{x+5}$

d. $\dfrac{5}{\sqrt{x^2+25}}$

19. Find all solutions in the interval $[0,2\pi)$ of $2\sin(x)-\sqrt{2}=0$.

a. $x=\dfrac{\pi}{4},-\dfrac{\pi}{4}$

b. $x=\dfrac{\pi}{2},\dfrac{3\pi}{2}$

c. $x=\dfrac{\pi}{3},\dfrac{2\pi}{3}$

d. $x=\dfrac{\pi}{4},\dfrac{3\pi}{4}$

20. Simplify the expression $\cos(x)+\sin(x)\tan(x)$.

a. $\cos(x)$

b. $\sec(x)$

c. $\cot(x)$

d. $\csc(x)$

Short Answer: Show all work to justify your answer. All answers should be exact (*no decimal answers*).

21. Find the x- and y-intercepts of $f(x) = (x-2)^2(x^2-25)$.

22. Solve the equation $e^{x+6} = 8$.

23. Find the exact value of $\tan^{-1}\frac{\sqrt{3}}{3}$.

24. Find all solutions on the interval $[0,2\pi)$ of $2\cos(2\theta) = \sqrt{3}$.

25. Suppose $\lim_{x\to -9} f(x) = -5$ and $\lim_{x\to -9} g(x) = -7$. Find $\lim_{x\to -9}\left[\frac{-8f(x)-2g(x)}{-9+g(x)}\right]$.

26. Find all solutions on the interval $[0,2\pi)$ of $\sin(2\theta)+\cos(\theta) = 0$.

27. Evaluate $\lim_{x\to 0}\frac{\sqrt{1+x}-1}{x}$.

28. Evaluate $\lim_{x\to -2^+}\left(\frac{x^2-7x+10}{x^3-4x}\right)$.

29. Evaluate $\lim_{x\to \infty}\left(\frac{2x^3-5x^2+3x}{-x^3-2x+7}\right)$.

30. Find all horizontal and vertical asymptotes of $f(x) = \frac{x-1}{x^3+5x^2-84x}$.