MA1200 Hand-in Assignment #2 due at 3:00PM (Hong Kong time zone) on October 25, 2024

Instructions to students:

1. *Please submit it via Canvas in a PDF file (you can handwrite the answers and take photos by your phone, then make it into a PDF file, see, for example, https://www.wikihow.com/Convert-JPG-to-PDF for how to combine JPG files to a PDF; you can also do it by note-taking apps on an iPad or a Surface)*
2. *The assignment is due on* **3:00PM of October 25, 2024**. *Your score of this assignment is only based on what appears on Canvas. Any unsuccessful submissions will* ***NOT*** *be marked, which results in your getting zero point.*
3. *Please write down your name and student ID.*

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10 points for every question below. There are totally ten questions. **Questions**:

1. Factorize

   (a) $x^4 - 1$, (b) $x^5 - 1$.

2. Express the following rational functions in partial fraction.

   (a) $\dfrac{x^3 + x^2 + 6x - 1}{x^3 - 1}$, (b) $\dfrac{11x + 10}{(x+1)^2 x^2}$.

3. Calculate

   (a) $C_3^9 C_9^{12}$, (b) C_{n-3}^n ($n \geq 3$ is an integer).

4. Simplify

   (a) $(\tan\alpha + \sec\alpha)(\tan\alpha - \sec\alpha)$, (b) $1 - \dfrac{\cos^2\alpha}{1 + \sin\alpha}$.

5. It is given that $\sin A = -\frac{1}{3}$ with $-\pi < A < -\frac{\pi}{2}$, and that $\cos B = \frac{2}{5}$ with $-\frac{\pi}{2} < B < 0$. Calculate the exact values of

   (a) $\tan(A + B)$, (b) $\cot(A - B)$.

6. Calculate the values of the following formulas. Caution! You need to present your result in the principal ranges of appropriate inverse of trigonometric functions.

   (a) $\cos^{-1}(\cos(-\frac{6\pi}{5}))$, (b) $\cos^{-1}(\sin(-\frac{2\pi}{3}))$, (c) $\sin^{-1}(\cos(\frac{5\pi}{6}))$, (d) $\tan^{-1}(\tan(3))$.

7. Does $\cos(\csc^{-1}(\dfrac{2}{\sqrt{3}}))$ exists? If yes, find its value. If no, give your reason. How about $\cot(\tan^{-1}(0))$?

8. Given $\csc\alpha = \frac{13}{5}$ and α in the second quadrant, find the other five trigonometric functions of α.

9. Express $\cos x + \sqrt{3}\sin x$ in the form of $A\cos(x-\alpha)$ with α in the third quadrant and $A < 0$.

10. Find the general solution of $3(\tan(3\theta))^2 = 1$. The unknown is θ.

End