Access to Science, Engineering and Agriculture: Mathematics 1
MATH00030
Assignment 3
Due Date: By 6.30pm on Wednesday 29/11/17

Show all your workings - part of overall mark

1. Using the parity identities and the fact that trigonometric functions are periodic, calculate $\cos\left(\frac{5\pi}{3}\right)$.

2. Using the co-function and parity identities, calculate $\sin\left(\frac{2\pi}{3}\right)$.

3. For each of the following triangles, find the lengths of all the remaining sides and sizes of all the remaining angles.

   (a)

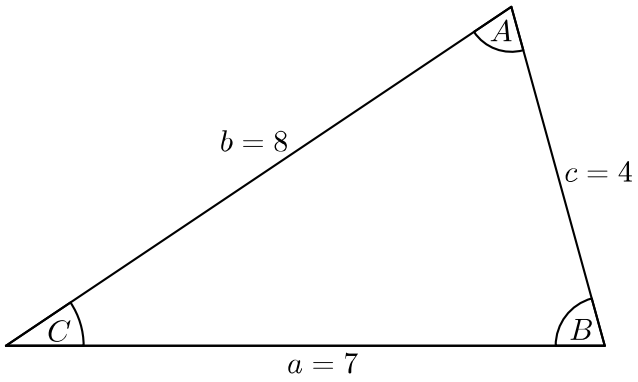

Figure 1: The triangle for Exercise 3(a).

   (b)

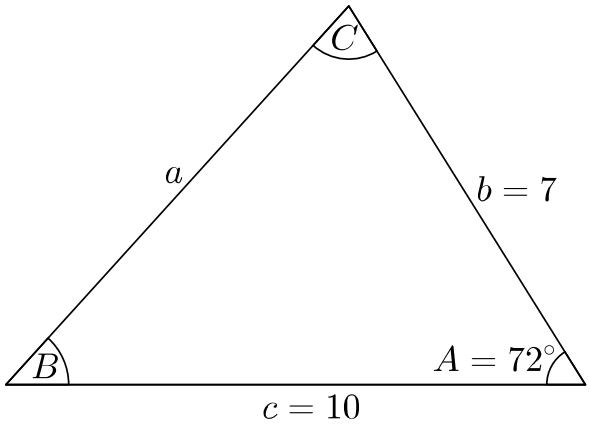

Figure 2: The triangle for Exercise 3(b).

4. Using the sum or difference formulae, calculate $\tan\left(-\frac{\pi}{12}\right)$.

5. Using the half angle formulae, calculate $\cos\left(\frac{\pi}{12}\right)$.

6. Find the derivative of $f(x) = x^2 + x - 3$ using first principles.

7. Find the derivatives of the following functions. Note that these can be done just using Table 1 of Chapter 6 of the course notes.

   (a) $f(x) = 6$.
   (b) $f(x) = x^7$.
   (c) $f(x) = x^{2e}$.
   (d) $f(x) = e^{3x}$.
   (e) $f(x) = \ln(5x)$ (where $x > 0$).
   (f) $f(x) = \sin(-3x)$.

8. Find the derivatives of the following functions. Note that these can be done using Table 1 of Chapter 6 of the course notes together with the Sum and Multiple Rules.

   (a) $f(x) = 2 - 3x^2 + 2x^{\frac{3}{4}}$.
   (b) $f(x) = -2x^{-3} + 3\cos(2x)$.
   (c) $f(x) = 2 - 3e^{-5x} + 4\ln(-2x)$ (where $x < 0$).

9. Find the following integrals. Note that these can be done just using Table 1 of Chapter 7 of the course notes.

   (a) $\int 6\,dx$.
   (b) $\int_1^2 x^7\,dx$.
   (c) $\int x^{2e}\,dx$.
   (d) $\int_0^1 e^{3x}\,dx$.
   (e) $\int \cos(4x)\,dx$.
   (f) $\int_0^{\frac{\pi}{2}} \sin(-3x)\,dx$.

10. Find the following integrals. Note that these can be done using Table 1 of Chapter 7 of the course notes together with the Sum and Multiple Rules.

    (a) $\int_0^1 2 - 3x^2 + 2x^{\frac{3}{4}}\,dx$.
    (b) $\int -2x^{-3} + 3\cos(2x)\,dx$.

(c) $\int_1^2 2 - 3e^{-5x}\, dx.$

11. For the list of numbers $1, 2, -9, -4, 9, 1, 2, 5, -6, -5$, find the

    (i) Mean

    (ii) Median

    (iii) Mode

    (iv) Variance

    (v) Standard deviation

    (vi) Interquartile range

12. Find the line of best fit using the least squares method with the points $(-7, -2), (-6, -1), (-4, 0), (-2, 1), (0, 0), (1, 1), (2, 2), (6, 2), (7, 3)$ and $(9, 3)$. Plot the line of best fit and the points on a graph.