Loughborough University

Week 6: More Integration, Trigonometric Functions

Try these exercises now, do not use a calculator, and try to solve the exercises without help

1. Evaluate the following integral using partial fractions

   $\int \frac{x^2+4}{3x^3+4x^2-4x}\,dx$

2. Evaluate the following integral using partial fractions

   $\int \frac{2x}{(x-1)^2(x+1)}\,dx$

3. Evaluate the following integral

   (a) Use the substitution $x = u^2, u > 0$, to show that

   $$\int \frac{1}{x(2\sqrt{x}-1)}\,dx = \int \frac{2}{u(2u-1)}\,du$$

   (b) Hence show that $\int_1^9 \frac{1}{x(2\sqrt{x}-1)}\,dx = 2\ln(\frac{a}{b})$

   where a and b are to be determined.

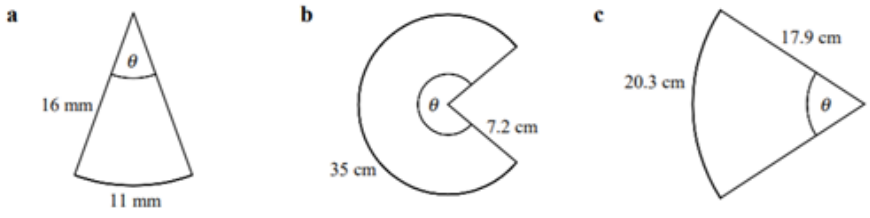
4. Convert each angle from radians to degrees, giving your answers to 1 decimal place:

   a) $2 radiants$ b) $0.5 radiants$ c) $\frac{\pi}{4} radiants$ d) $\frac{5\pi}{3} radiants$ e) $0.742 radiants$

5. Convert to radiants

   a) 120^o b) 135^o c) $450^o s$

6. Using the formula $s = r\theta$, calculate the angle θ in each of the following circular sectors:



7. Sketch, over $0 < \theta < 2\pi$ the graph of $\sin 2\theta$. Mark the horizontal axis in radiants. Write down the period of $\sin\theta$.