University of Nottingham
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Foundation Calculus and Mathematical Techniques (CELEN037)

Answers to Worksheet #8

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1. **Evaluating definite integrals**

   (i) $\dfrac{\pi}{4}$ (ii) $\dfrac{\ln 3}{4}$ (iii) $\ln 3$

   (iv) $\dfrac{\pi}{2}$ (v) 1 (vi) $\dfrac{1}{3} - \dfrac{1}{3\sqrt{3}}$

2. **Definite integrals using substitution**

   (i) 0 (ii) $\dfrac{1}{3}$ (iii) $\dfrac{\pi}{6}$

   (iv) $\dfrac{2\sqrt{2}}{3}\left(\sqrt{5}-2\right)$ (v) -4 (vi) $2\left(\sqrt{6}-\sqrt{5}\right)$

   (vii) $\sin^{-1}(\ln 2)$ (viii) $\tan(e)$

3. **Integration by parts for definite integrals**

   (i) $\dfrac{2e^3+1}{9}$ (ii) $3\ln 3 - 2$ (iii) $2\big(\ln 5 + \tan^{-1}(2) - 2\big)$

   (iv) $\dfrac{4\pi}{3} - \sqrt{3}$

4. **Use of properties for evaluating definite integrals**

   (i) $\dfrac{49}{6}$ (ii) 2 (iii) $\dfrac{\pi}{4}$

   (iv) 2 (v) $\dfrac{7}{2}$ (vi) 0

5. **Area calculation using definite integrals**

   (i) 0 (ii) $\dfrac{4}{3}$ (iii) 36

   (iv) 2 (v) 2 (vi) 2

6. **Area of region bounded by two curves**

   (i) $\dfrac{49}{192}$ (ii) $\pi - 2$