

<p>1. Given $\frac{d}{dx}\left(\frac{\log_e x}{x}\right) = \frac{1 - \log_e x}{x^2}$, evaluate $\int_1^e \left(\frac{1 - \log_e x}{x^2}\right) dx$.</p>	<p>2. Show that $\frac{d}{dx}(\sec(2x) + 1) = 2\sec(2x)\tan(2x)$. Hence find $\int (\sec(2x)\tan(2x)) dx$.</p>
<p>3. Find the derivative of $\sqrt{\cos(2x)}$. Hence evaluate $\int_0^{\frac{\pi}{6}} \sqrt{\sin(2x)\tan(2x)} dx$.</p>	<p>4. Find $f(x)$, given $f'(x) = \sec^2(2x)$ and $f\left(\frac{\pi}{8}\right) = 1$.</p>
<p>5. Find $\frac{d}{dx}\left(\sqrt{1+x^2}\right)$ and hence $\int_0^1 \frac{x}{\sqrt{1+x^2}} dx$.</p>	<p>6. Find $f'(x)$, given $f(x) = x \sin x$. Hence find $\int x \cos x dx$.</p>
<p>7. Show that $\frac{d}{dx}(x+n)e^x = (x+n+1)e^x$, where n is an integer. Hence find $\int (x+n)e^x dx$.</p>	<p>8. Find the area of the region bounded by the x-axis and the curve $y = (x+2)(x-1)$.</p>
<p>9. Find the area of the region bounded by the x-axis and the curve $y = (x-3)(x-2)(x-1)^2$.</p>	<p>10. Find the area of the region bounded by $y = (x+1)^2(x-2)^2$ and $y = 16$.</p>
<p>11. Find the area of the region bounded by $y = (x+1)(x-1)^2$ and $y = 5x+1$.</p>	<p>Numerical, algebraic and worded answers.</p> <ol style="list-style-type: none"> 1. $1/e$ 2. $\frac{1}{2} \sec(2x) + c$ 3. $-\sqrt{(\sin(2x)\tan(2x))}$ 4. $1 - 1/\sqrt{2}$ 5. $\frac{1}{2} (\tan(2x) + 1)$ 6. $x\sqrt{1+x^2}$ 7. $\sqrt{(1+t^2)} - 1$ 8. $x \cos x + \sin x$ 9. $x \sin x + \cos x + c$ 10. $(x+n-1)e^x + c$ 11. 4.5 sq units 12. 0.5 sq units 13. 62.5 sq units 14. $253/12$ sq units