MA 138 Worksheet #4

Section 7.2

1/18/24

Rule for Integration by Parts

If $f(x)$ and $g(x)$ are differentiable functions, then

$$\int f(x)g'(x)\,dx = f(x)g(x) - \int f'(x)g(x)\,dx;$$

$$\int_a^b f(x)g'(x)\,dx = f(x)g(x)\Big]_a^b - \int_a^b f'(x)g(x)\,dx.$$

1 Use integration by parts to evaluate the indefinite integral: $\int 2p^5 \ln(p)\,dp.$

2 Use integration by parts to evaluate the indefinite integral: $\int 3x\,\cos(x)\,dx.$

3 Use integration by parts to evaluate the indefinite integral: $\int e^x \sin x\,dx.$

4 Make an appropriate substitution and then use integration by parts to evaluate the indefinite integral: $\int x^3 e^{-x^2/2}\,dx.$

5 Use either substitution or integration by parts to evaluate each indefinite integral:

(a) $\int 2x\,\sin(x^2)\,dx,$

(b) $\int 2x^2\,\sin(x)\,dx.$

6 If $g(1) = -3$, $g(5) = 6$, and $\int_1^5 g(x)\,dx = -9$, evaluate the definite integral $\int_1^5 x\,g'(x)\,dx.$