MATH 203 WORKSHEET #10 SOLUTIONS

(1) \(\int \frac{1}{5-x} \, dx = -\ln|5-x| + C\)
Substitute \(u = 5-x\) so that \(du = -1 \, dx\), or notice that the original problem is \(-\int \frac{1}{x-5} \, dx\).

(2) \(\int \frac{1}{x^2 + 6x + 11} \, dx = \frac{1}{\sqrt{2}} \arctan\left(\frac{x + 3}{\sqrt{2}}\right) + C\)
Complete the square and substitute \(u = x + 3\) with \(a^2 - 2\).

(3) \(\int \frac{x}{x^2 - 2x + 3} \, dx = \frac{1}{2} \ln(x^2 - 2x + 3) + \frac{1}{\sqrt{2}} \arctan\left(\frac{x-1}{\sqrt{2}}\right) + C\)
Complete the square, then substitute \(u = x-1\) so that \(du = dx\) and \(x = u+1\).
Then make two separate integrals.

(4) \(\int \frac{x+7}{x^2 + 7} \, dx = \frac{1}{2} \ln(x^2 + 7) + \sqrt{7} \arctan\left(\frac{x}{\sqrt{7}}\right) + C\)
Make two separate integrals.

(5) \(\int_0^1 \frac{4}{(1+2x)^3} \, dx = \frac{8}{9}\)
Substitute \(u = 1 + 2x\) so that \(du = 2 \, dx\), and use \(\int u^{-3} \, du = \frac{u^{-2}}{-2} = -\frac{1}{2u^2}\).

(6) \(\int_2^5 \frac{1}{x^2} \, dx = \frac{3}{10}\)
Use \(\int u^{-2} \, du = -u^{-1} + C\).

(7) \(\int_3^5 \frac{2}{x+4} \, dx = 2 \ln 9 - 2 \ln 7\)

(8) \(\int_0^2 e^{5x} \, dx = \frac{e^{10}}{5} - \frac{1}{5}\)
Substitute \(u = 5x\) so that \(du = 5 \, dx\).

(9) \(\int x^4 \sqrt{4 + x^5} \, dx = \frac{2}{15} (4 + x^5)^{\frac{3}{4}} + C\)
Substitute \(u = 4 + x^5\) so that \(du = 5x^4 \, dx\).

(10) \(\int \frac{x}{x^2 + 5} \, dx = \frac{1}{2} \ln(x^2 + 5) + C\)