MATH 203 WORKSHEET #10 SOLUTIONS

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

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

(3) $\displaystyle\int \frac{x}{x^2-2x+3}\,dx = \frac{1}{2}\ln(x^2-2x+3) + \frac{1}{\sqrt{2}}\arctan(\frac{x-1}{\sqrt{2}}) + C$
Complete the square, then substitute $u = x-1$ so that $du = dx$ and $x = u+1$.

Then make two separate integrals.

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

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

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

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

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

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

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