*Hand In Next Time.* WeBWorK: Set Day10 due Thursday night (long set). Name: Answers

**1.** Determine $\int \sec(1+2\sin x)\cos x\,dx = \frac{1}{2}\int \sec u\,du$

$u = 1+2\sin x$

$du = 2\cos x\,dx$ $\quad = \frac{1}{2}\ln|\sec u + \tan u| + c$

$\frac{1}{2}du = \cos x\,dx$

$= \frac{1}{2}\ln|\sec(1+2\sin x) + \tan(1+s\sin x)| + c$

**2.** Determine $\int \frac{\sqrt{\ln t}}{t}\,dt = \int u^{1/2}\,du = \frac{2}{3}u^{3/2} + c$

$u = \ln t$

$du = \frac{1}{t}dt$ $\quad = \frac{2}{3}(\ln t)^{3/2} + c$

**3.** Determine $\int (x+2)\tan(x^2+4x)\,dx = \frac{1}{2}\int \tan(u) + c = \frac{1}{2}\ln|\sec u| + c$

$u = x^2+4x$

$du = (2x+4)dx$ $\quad = \frac{1}{2}\ln|\sec(x^2+4x)| + c$

$\frac{1}{2}du = (x+2)dx$

**4.** Determine $\int \frac{x^2}{1+4x^6}\,dx = \frac{1}{6}\int \frac{1}{1+u^2}\,du = \frac{1}{6}\arctan(u) + c$

$u^2 = 4x^6$

$u = 2x^3$ $\quad = \frac{1}{6}\arctan(2x^3) + c$

$du = 6x^2\,dx$

$\frac{1}{6}du = x^2\,dx$

**5.** Determine $\int \frac{x^5}{1+4x^6}\,dx = \frac{1}{24}\int \frac{1}{u}\,du = \frac{1}{24}\ln|u| + c$

$u = 1+4x^6$ $\quad = \frac{1}{24}\ln(1+4x^6) + c$

$du = 24x^5\,dx$

$\frac{1}{24}du = x^5\,dx$

**6.** Hint: See today's online notes, pages 11–12. Determine $\int_0^4 x\sqrt{2x+1}\,dx. = \frac{1}{2}\int_0^9 \frac{1}{2}(u-1)u^{1/2}\,du$

$u = 2x+1 \Rightarrow u-1 = 2x$ $\quad = \frac{1}{4}\int_0^9 u^{3/2} - u^{1/2}\,du$

$du = 2dx$ $\quad \frac{1}{2}(u-1) = x$

$\frac{1}{2}du = dx$ $\quad = \frac{1}{4}\left[\frac{2}{5}u^{5/2} - \frac{2}{3}u^{3/2}\right]\Big|_1^9$

$x = 0 \Rightarrow u = 2(0)+1 = 1$

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$= \frac{1}{4}\left(\left[\frac{2}{5}(243) - \frac{2}{3}(27)\right] - \left(\frac{2}{5} - \frac{2}{3}\right)\right)$

$x = 4 \Rightarrow u = 9$

$= 298/15 = 19.8\overline{6}$

Another Method:

$u = \sqrt{2x+1}$ $\qquad x = 0 \Rightarrow u = \sqrt{1} = 1$

$\qquad\qquad\qquad\qquad x = 4 \Rightarrow u = \sqrt{9} = 3$

$u^2 = 2x+1$

$u^2 - 1 = 2X$

Take deriv

$\frac{u^2-1}{2} = x \longrightarrow$ so $u\,du = dx$

$$\int_0^4 x\sqrt{2x+1}\,dx = \int_1^3 \overset{x}{\frac{(u^2-1)}{2}}\,\overset{\sqrt{}}{u}\cdot\overset{dx}{u\,du}$$

$$= \frac{1}{2}\int_1^3 u^4 - u^2 \;du$$

$$= \frac{u^5}{10} - \frac{u^3}{6}\Big|_1^3$$

$$= \left(\frac{243}{10} - \frac{27}{6}\right) - \left(\frac{1}{10} - \frac{1}{6}\right)$$

$$= \frac{298}{15} = 19.8\overline{6}$$