Calculus 1B - Answers to SSS exercises, week 2

1. 1.1 $\dfrac{-1}{x^4+1} + C$

   1.2 $\frac{1}{5} \ln|5s+4| + C$

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2. 2.1 $\frac{1}{3}$

   2.2 $-\ln 3$ (or: $\ln \frac{1}{3}$)

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3. 3.1 $\left(\frac{1}{2}\ln x - \frac{1}{4}\right)x^2 + C$

   3.2 $\left(\frac{1}{4}x - \frac{1}{16}\right)e^{4x} + C$

   3.3 $\left(\frac{1}{4}x^2 - \frac{1}{8}x + \frac{1}{32}\right)e^{4x} + C$

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4. π

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5. 5.1 Improper integral of Type II.2 (page 499)

   5.2 4

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6. 6.1 $\sin(-x)\cos(-x) = -\sin(x)\cos(x)$ for every $x \in \mathbb{R}$, so $\sin x \cos x$ is odd

6.2 $\sin^2(-x) = (-\sin(x))^2 = \sin^2(x)$ for every $x \in \mathbb{R}$, so $\sin^2 x$ is even

6.3 $\int_{-\pi}^{\pi} \sin x \cos x \, dx = 0$ by 6.1 and Theorem 8(a); and

$$\int_{-\pi}^{\pi} \sin^2 x \, dx = 2 \int_{0}^{\pi} \sin^2 x \, dx = \pi \quad ,$$

where the first equality follows from 6.2 and Theorem 8(b). Note that we can use formula (7) on page 26 to find an antiderivative of $\sin^2 x$.

6.4 -