7.1, #21.

$$\int \left(\frac{3}{t} - \frac{2}{t^2}\right) dt = 3\ln|t| + 2t^{-1} + C$$

7.1, #26.

$$\int (e^x + 5)\,dx = e^x + 5x + C$$

7.1, #43. The indefinite integral is 7.1, #14 on assignment 6.

$$\int_1^2 \frac{1+y^2}{y}\,dy = (\ln y + y^2/2)\big|_1^2 = \ln 2 + 3/2 = 2.193$$

7.1, #54. The average value of $\sin t$ on the interval $0 \le t \le 2\pi$ is

$$\frac{1}{2\pi - 0}\int_0^{2\pi} \sin t\,dt = 0.$$

We can evaluate this integral using an antiderivative or by knowing that the areas above and below the x-axis are equal. This is becasue $\sin(t+\pi) = -\sin t$. The part of the graph above the x-axis balances the part below. This is a huristic argument that the average should be 0.

The average value of $\sin t$ on $0 \le t \le \pi$ is

$$\frac{1}{\pi}\int_0^{\pi} \sin t\,dt = \frac{1}{\pi}[-\cos t]_0^{\pi} = \frac{1}{\pi}(-(-1) - (-1)) = \frac{2}{\pi}.$$

7.2, #2. Use the substitution $u = x^2$, $du = 2x\,dx$ to get

$$\int 2x\cos(x^2)\,dx = \int \cos u\,du = \sin u + C = \sin(x^2) + C$$

7.2, #5. Use the substitution $u = \sin x$, $du = \cos x\,dx$ to get

$$\int e^{\sin x}\cos x\,dx = \int e^u\,du = e^u + C = e^{\sin x} + C$$

7.2, #6. Use the substitution $u = x^2 + 1$, $du = 2x\,dx$ to get

$$\int \frac{x}{x^2+1}\,dx = \frac{1}{2}\int \frac{du}{u} = \frac{1}{2}\ln|u| + C = \frac{1}{2}\ln(x^2+1) + C$$