[5 points]

1. Compute the indefinite integral:

$$\int (x^2 + \tfrac{3}{x^2} + \tfrac{1}{x})dx = \frac{1}{3}x^3 + 3\cdot\frac{-1}{x} + \ln|x| + c$$

$$= \frac{1}{3}x^3 - \frac{3}{x} + \ln|x| + c$$

Common errors: • Using ln(x) instead of ln|x|
• Omitting the "+c"

[5 points]

2. Compute the definite integral:

$$\int_{-1}^{1} (4 + 4e^{2t})dt = \left(4x + 2e^{2t}\right)\Big|_{-1}^{1}$$

$$= (4 + 2e^2) - (-4 + 2e^{-2})$$

$$= 8 + 2e^2 - 2e^{-2}$$

[10 points]

3. Mark as true or false. (To be "true", it must *always* be true. If needed, you should assume that f, f', f'' and g are defined and continuous on $\mathbb{R}$.)

T **a.** $\int (f(x) - g(x))\,dx = \int f(x)dx - \int g(x)dx$.

T **b.** $\int_a^b f(x)dx + \int_b^a f(x)dx = 0$. (Use adjacent intervals property.)

T **c.** $\int f'(t)dt = f(t) + c$.

T **d.** $\int f''(t)dt = f'(t) + c$.

T **e.** $\int \ln x\,dx = x\ln x - x + c$, on the domain $x \in (0, +\infty)$.

Since $\frac{d}{dx}(x\ln x - x) = 1\cdot\ln x + x\cdot\frac{1}{x} - 1 = \ln x$.