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$$1. \int_1^2 (2x^3 + 3x^2 - x) dx = \left[ \frac{x^4}{2} + x^3 - \frac{x^2}{2} \right]_1^2 = \frac{16}{2} + 8 - \frac{4}{2} - \left( \frac{1}{2} + 1 - \frac{1}{2} \right) = 8 + 8 - 2 - 1 = 13.$$

$$2. \int_0^1 (2x - 1)^2 dx = \left[ \frac{1}{6} (2x - 1)^3 \right]_0^1 = \frac{1}{6} \times 1^3 - \frac{1}{6} \times (-1)^3 = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}.$$

$$3. \int_{-1}^1 2xe^{x^2} dx = [e^{x^2}]_{-1}^1 = e - e = 0.$$

$$4. \int_0^1 \frac{e^x + 1}{e^x + x} dx = [\ln(e^x + x)]_0^1 = \ln(e + 1) - \ln(1) = \ln(e + 1).$$

$$5. \int_5^8 \frac{3}{2x - 5} dx = \left[ \frac{3}{2} \ln(2x - 5) \right]_5^8 = \frac{3}{2} \ln(11) - \frac{3}{2} \ln(5) = \frac{3}{2} \ln\left(\frac{11}{5}\right).$$