Reference: Berresford, Sections 5.3, 5.4

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1. (1 pt) Evaluate the definite integral

$$\int_3^5 (12x^2 - 2x + 4)\,dx$$

_____

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2. (1 pt) The value of $\int_3^5 \frac{1}{x^2}\,dx$ is

_____

3. (1 pt) Evaluate the definite integral

$$\int_1^9 \frac{4x^2 + 5}{\sqrt{x}}\,dx$$

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4. (1 pt)
Evaluate the integral

$$\int_1^e \frac{-1x^2 + 9x + 8}{x}\,dx$$

Integral = _____

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5. (1 pt) Find area of the region under the curve $y = 2x^3 - 4$ and above the x-axis, for $2 \le x \le 4$.
area = _____

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6. (1 pt) Sketch the region enclosed by $y = 4x$ and $y = 4x^2$.
Decide whether to integrate with respect to x or y, and then find the area of the region.
The area is _____.

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7. (1 pt) Sketch the region enclosed by $2y = 4\sqrt{x}, y = 5$, and $2y + 3x = 7$.
Decide whether to integrate with respect to x or y, and then find the area of the region.
The area is _____.

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8. (1 pt) The parabola shown below has vertex at the origin, and passes through the point $(2,3)$. The shaded region is bounded by the parabola, its tangent line at the point $(2,3)$, and the x axis. Find its area.
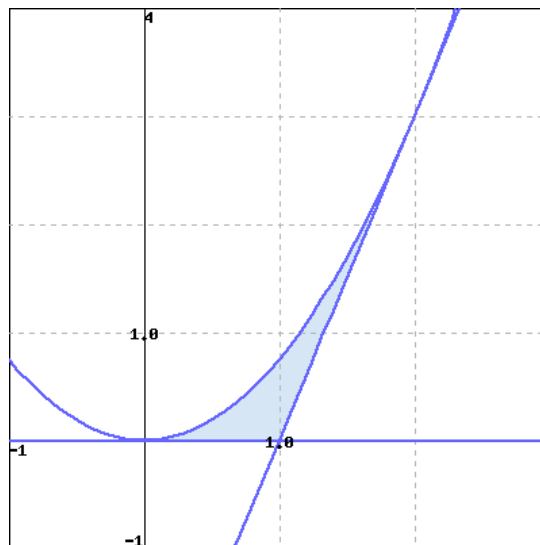
Area = _____

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9. (1 pt) Find the average value of $f(x) = x^3$ on the interval $[3,5]$.

Answer: _____

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10. (1 pt)
Water flows from the bottom of a storage tank at a rate of $r(t) = 200 - 4t$ liters per minute, where $0 \le t \le 50$. Find the amount of water (in liters) that flows from the tank during the first 20 minutes.
Amount of water = _____ L

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11. (1 pt) The manufacturing company you work for has marginal production cost for producing x units given by

$$MC(x) = 180e^{-0.03x} \text{ dollars/unit.}$$

Calculate the total cost of producing the first 150 units.
Total cost = _____ dollars

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12. (1 pt) A certain motorcycle manufacturer has been building motorcycles for 93 years. Over that period, production has increased steadily at an annual rate of 2%, so that the production rate, in motorcycles/year, after t years was

$$r(t) = A \cdot 1.02^t$$

where A is a constant representing the initial production rate. What fraction of their total production was built during the last 14 years? Your answer should be a number between 0 and 1.
Answer: _____