Differentiating from First Principles - Past Exam Questions

1. (a) Given that $y = 2x^2 - 5x + 3$, find $\frac{dy}{dx}$ from first principles. **[5]**

(b) Given that $y = \frac{a}{x} + 2x^{\frac{3}{2}}$ and $\frac{dy}{dx} = 7$ when $x = 4$, find the value of the constant a. **[4]**

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2. (a) Given that $y = x^2 - 3x + 4$, show from first principles that **[5]**

$$\frac{dy}{dx} = 2x - 3$$

(b) Differentiate $y = \frac{2}{x^2} + 7\sqrt{x}$ with respect to x. **[2]**

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3. Given that $y = x^2 - 7x + 2$, find $\frac{dy}{dx}$ from first principles. **[5]**

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4. (a) Differentiate $y = x^2 - 6x + 2$ from first principles. **[5]**

(b) Differentiate $\frac{3}{x^2} + x^{\frac{5}{2}}$ with respect to x. **[2]**

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5. (a) Given that $y = x^2 + 5x - 2$, find $\frac{dy}{dx}$ from first principles. **[5]**

(b) Differentiate $\frac{3}{x} - 2x^{\frac{5}{2}}$ with respect to x. **[4]**

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6. (a) Given that $y = 2x^2 + x + 3$, find $\frac{dy}{dx}$ from first principles. **[5]**

(b) Given that **[5]**

$$y = \sqrt{x} + \frac{k}{x}$$

and that $\frac{dy}{dx} = 2$ when $x = 4$, find the value of the constant k. **[4]**
