SECTION 3.3

3.3.1 Find $\dfrac{dy}{dx}$ if $y = \dfrac{3x^3 + 5x^2 + \sqrt{x}}{x}$.

3.3.2 Find $\dfrac{dy}{dx}$ if $y = \dfrac{x^2 + 3x}{7 - 2x}$.

3.3.3 Find $f''(2)$ if $f(x) = \dfrac{-8}{x^2} + \dfrac{1}{5}x^5$.

3.3.4 Find $\dfrac{dy}{dx}$ if $y = -2\left(x^2 - 5x\right)\left(3 + x^7\right)$.

3.3.5 Find $f'(s)$ if $f(s) = (3s^2 + 4)(s^2 - 9s)$.

3.3.6 Find $f'(x)$ if $f(x) = \dfrac{2x + 1}{x^2 + 3x}$.

3.3.7 If $f(3) = 2, f'(3) = -1, g(3) = 3, g'(3) = 0$, find $F'(3)$

(a) $F(x) = 2f(x) - g(x)$

(b) $F(x) = \dfrac{1}{2}f(x)g(x)$

(c) $F(x) = \dfrac{1}{3}\dfrac{f(x)}{g(x)}$

3.3.8 Find $\dfrac{d^2y}{dt^2}$ if $y = -\dfrac{1}{t} - \dfrac{5}{t^2}$.

3.3.9 Find $f'(u)$ is $f(u) = \dfrac{u^2 - 5}{3u^2 - 1}$.

3.3.10 Find $\dfrac{dy}{dx}$ if $y = \left(x^2 - 2\right)\left(x^3 + 5x\right)$.

3.3.11 Find $\dfrac{dv}{dh}$ if $v = \pi\left(ah^2 - \dfrac{1}{3}h^3\right)$, a is a constant.

3.3.12 Find $f'(x)$ if $f(x) = \left(x^2 + 1\right)\left(x^3 - 2x^2 + x\right)$.

3.3.13 Find equations for the tangents and normals to the graph of $y = 4 - 3x - x^2$ at those points where the curve intersects the x-axis.

3.3.14 Find equations for the tangents and normals to the graph of $y = 6 - x - x^2$ at the points where the curve intersects the x-axis.

3.3.15 Find the points on the graph of $y = 2x^3 - 3x^2 - 12x + 20$ at which the tangent is parallel to the x-axis.

3.3.16 Show that the parabola $y = -x^2$ and the line $x - 4y - 18 = 0$ intersect at right angles at one of their points of intersection.

3.3.17 Find the equation of the tangents and normals to the graph of $y = \dfrac{x + 1}{x - 1}$ at $x = 2$.

3.3.18 Find the equation of the tangent and normal to the graph of $y = 10 - 3x - x^2$ at the point where the curve intersects the x-axis.

3.3.19 Show that the parabola $y = x^2$ and the line $x + 2y - 3 = 0$ intersect at right angles at one of their points of intersection.