<u>Grading scheme for midterm1</u>

<u>Q1)</u> a) $F'(x) = -sinx\int_0^{tanx}(\sqrt{1+t^2})dt + cosx.\sqrt{1+(tanx)^2}(secx)^2$ [redacted]

$F'(0) = 1$ [redacted]

b) $\int \frac{dx}{\sqrt{x}(1+\sqrt{x})^2} = 2\int \frac{1}{u^2}du\ ,\ \ u = \sqrt{x}+1$ [redacted]

$= \frac{-2}{u} + C = -\frac{2}{\sqrt{x}+1} + C$ [redacted]

c) $P = \{0,1,2,3,4,5\}$

$T_5 = \frac{5-0}{2\times 5}\left(1+2+\frac{8}{3}+4+\frac{32}{5}+\frac{32}{6}\right)$ [redacted]

$= 10{,}7\ \ (\mathbf{0,5})$

<u>Q2</u> a) $\int(lnx+1)3^{xlnx}dx = \int 3^u du\ ,\ \ u = xlnx$ [redacted]

$= \frac{3^u}{ln3} + C = \frac{3^{xlnx}}{ln3} + C$ [redacted]

b)

$lny = lnx + 3\,ln(x^2+1) - \frac{1}{4}\,ln\,(2x-1)$ [redacted]

$\frac{y'}{y} = \frac{1}{x} + \frac{6x}{x^2+1} - \frac{1}{2(2x-1)}$ $(\mathbf{1})$

So $y' = \left(\frac{1}{x} + \frac{6x}{x^2+1} - \frac{1}{2(2x-1)}\right)\frac{x(x^2+1)^3}{\sqrt[4]{2x-1}}$ [redacted]

c) $\int \frac{sec^2 x dx}{\sqrt{9-(tanx)^2}} = \int \frac{du}{\sqrt{9-u^2}} \qquad u = tanx$ [redacted]

$= \sin^{-1}\left(\frac{u}{3}\right) + C = \sin^{-1}\left(\frac{tanx}{3}\right) + C$ [redacted]

Q3) a) $\int \frac{dx}{x\sqrt{16x^4-1}} = \frac{1}{2}\int \frac{du}{u\sqrt{u^2-1}}, \quad u = 4x^2$ [redacted]

$= \frac{1}{2}\sec^{-1}(|u|) + C = \frac{1}{2}\sec^{-1}(4x^2) + C$ [redacted]

b) $\int \frac{x^2 dx}{\sqrt{x^6-25}} = \frac{1}{3}\int \frac{du}{\sqrt{u^2-25}}, u = x^3$ [redacted]

$= \frac{1}{3} cosh^{-1}\left(\frac{u}{5}\right) + C = \frac{1}{3} cosh^{-1}\left(\frac{x^3}{5}\right) + C$ [redacted]

c) $\int \frac{dx}{xlnx\sqrt{1-(lnx)^4}} = \frac{1}{2}\int \frac{du}{u\sqrt{1-u^2}}, \quad u = (lnx)^2$ [redacted]

$= -\frac{1}{2} sech^{-1}(|u|) + C$

$= -\frac{1}{2} sech^{-1}(lnx)^2) + C$ [redacted]