Question 1:

(a)[3 points] Find the average value of $f(x) = 4x^3 + \dfrac{2}{x}$ on the interval $[1, e]$.

(b)[3 points] Compute $F'(1)$ if $F(x) = \displaystyle\int_0^{x^2} e^{\sqrt{t}}\, dt$

(c)[4 points] Evaluate $\displaystyle\int_{-\pi/2}^{\pi/2} \sqrt{\sin x + 1}\cos x\, dx$.

Question 2 [10 points]: Evaluate

$$\int t^{-1/2}(\ln t)^2\,dt$$

Question 3 [10 points]: Evaluate

$$\int_0^{\pi/4} \sec^4\theta \tan^4\theta \, d\theta$$

Question 4 [10 points]: Evaluate

$$\int \frac{x^3}{\sqrt{4+x^2}}\,dx$$

Question 5 [10 points]: Evaluate

$$\int \frac{x^2 - 8x + 18}{x(x-3)^2}\, dx$$