

2. (8 pts each) Differentiate the following functions:

a) $f(x) = \sqrt{9-x^2} + 3\sin^{-1}\left(\frac{x}{3}\right)$

b) $f(x) = \sinh(\tan^{-1} e^{2x})$

3. (7 pts each) Evaluate the following indefinite integrals:

a) $\int x^2 \cos x \, dx$

b) $\int (1 + \tanh x) / (\cosh^2 x) \, dx$

c) $\int dx / (\sqrt{4x - x^2})$

4. (10 pts each) Evaluate the following definite integrals:

a) $\int_1^{e^2} x \ln \sqrt{x} dx$

b) $\int_0^{\pi/4} (\sin^3 x) / (\sqrt{\cos x}) dx$