



2. (33 points, 11 points each) Evaluate each of the following integrals (**You must show all of your work to receive full credit. Here, no calculators allowed**).

a.  $\int x \cos(3x) dx$

b.  $\int \frac{2x + 7}{(x - 1)(x + 2)} dx$

c.  $\int \frac{x^2}{\sqrt{1-x^6}} dx$

3. (8 points) Find the exact value of:  $\cos(\arctan(\frac{7}{3}))$ .

4. (8 points) Find  $f'(x)$  if  $f(x) = \tan^{-1}(\sqrt{x}) + \arcsin(x^2)$

5. (22 points) Determine whether the following improper integrals are convergent or divergent. If the integral is convergent find its value. **Make sure to show all details.**

a. (11 pts)  $\int_e^{\infty} \frac{1}{x \ln x} dx$

b. (11 pts)  $\int_3^4 \frac{1}{(x-3)^{0.95}} dx$

6. (11 points) By using a comparison theorem determine whether the following integral is convergent or divergent:  $\int_1^{\infty} \frac{x}{x^{2.1} + x + 3} dx$ .