1. To derive the formula for **Integration by Parts** we used which of the following theorems?

   1) The Fundamental Theorem of Calculus.

   2) The Product Rule of Differentiation.

   3) The Chain Rule of Differentiation.

   4) The Mean Value Theorem

2. Evaluate $\int_0^{\frac{\pi}{2}} x\cos 2x\ dx$. Hint: integration by parts.

3. Suppose that $f(1)=2$, $f(4)=7$, $f'(1)=5$, $f'(4)=3$ and f'' is continuous. Evaluate $\int_1^4 x f''(x)\,dx$.

4. Evaluate $\int \tan^{-1} x\,dx$.

5. Evaluate $\int e^x \cos x \, dx$.

6. A particle that moves along a straight line has velocity $v(t) = t^3 e^{-t}$ meters per second after t seconds. How far will it travel during the first t seconds?