

B4.

MATH 1700: Test #4 (Fall 2008)
Solutions

[7] 1. Evaluate the integral $\int_0^{\frac{1}{2}} \frac{2}{1+(2x)^2} dx$. Completely simplify your final answer.

Solution. $\int_0^{\frac{1}{2}} \frac{2}{1+(2x)^2} dx = \tan^{-1}(2x) \Big|_0^{\frac{1}{2}} = \tan^{-1}(1) - \tan^{-1}(0) = \frac{\pi}{4}.$

[9] 2. Evaluate $\int \ln(2x) dx$.

Solution. Use integration by parts with $u = \ln(2x)$, $dv = dx$. Compute: $du = \frac{2}{2x} dx = \frac{1}{x} dx$, and $v = x$.

So, $\int \ln(2x) dx = x \ln(2x) - \int x \frac{1}{x} dx = x \ln(2x) - x + c.$

[8] 3. Evaluate $\int \cos^{2008} x \sin x dx$.

Solution. Use $u = \cos x$, so that $du = -\sin x dx$. Get

$$\int \cos^{2008} x \sin x dx = \int u^{2008} (-du) = -\frac{u^{2009}}{2009} + c = -\frac{\sin^{2009} x}{2009} + c.$$