

MAC 2312 (Calculus II) — Answers
 QUIZ 3, Friday September 9, 2016

Name:

PID:

Remember to show all your work; you won't get any credits if only your answers are shown without the steps leading to them.

1. [10] Evaluate each integral:

a) $\int_0^1 \frac{x dx}{\sqrt{1-x^4}} = \int_0^1 \frac{\frac{1}{2} du}{\sqrt{1-u^2}} = \frac{1}{2} \arcsin u \Big|_0^1 = \frac{1}{2} (\arcsin 1 - \arcsin 0) = \frac{1}{2} \left(\frac{\pi}{2} \right) = \frac{\pi}{4}$
 $u = x^2$
 $du = 2x dx$

b) $\int_{-1}^0 t \sqrt{1+t^2} dt = \int_{\frac{1}{2}}^1 \sqrt{u} \cdot \frac{1}{2} du = \frac{1}{2} \left(\frac{2}{3} u^{3/2} \right) \Big|_{\frac{1}{2}}^1 = \frac{1}{3} (1 - 2\sqrt{2})$
 $u = 1+t^2$
 $du = 2t dt$

c) $\int_{\frac{\pi}{8}}^{\frac{\pi}{4}} \tan^7 x \sec^2 x dx = \int_{\frac{1}{\sqrt{3}}}^1 u^7 du = \frac{u^8}{8} \Big|_{\frac{1}{\sqrt{3}}}^1 = \frac{1}{8} \left(1 - \frac{1}{81} \right) = \frac{10}{81}$
 $u = \tan x$
 $du = \sec^2 x dx$

d) $\int_0^1 \frac{x}{(2-x^2)^{3/2}} dx = \int_{\frac{1}{2}}^1 \frac{-\frac{1}{2} du}{u^{3/2}} = \frac{1}{2} \int_1^2 u^{-3/2} du = \frac{1}{2} \left(-2u^{-1/2} \right) \Big|_1^2 = -\frac{1}{\sqrt{2}} + 1$
 $u = 2-x^2$
 $du = -2x dx$

e) $\int_1^e \frac{\ln x}{x} dx = \int_0^1 u du = \frac{u^2}{2} \Big|_0^1 = \frac{1}{2}$
 $u = \ln x$
 $du = \frac{dx}{x}$