MATH 230 QUIZ 1 NAME: SOLUTION

1. Find the general anti-derivative $F(x)$ to the following functions

(a) $f(x) = -8x + 2 - \frac{7}{x^5}$ $F(x) = \underline{-4x^2 + 2x + \frac{7}{4}x^{-4}} + C$

$f(x) = -8x + 2 - 7x^{-5}$

$F(x) = -\frac{8x^2}{2} + 2x - \frac{7x^{-4}}{-4} + C$

(b) $f(\theta) = 3\sec^2(\theta) - 4\sec(\theta)\tan(\theta)$ $F(\theta) = \underline{3\tan(\theta) - 4\sec(\theta)} + C$

2. Evaluate the definite integrals.

(a) $\int_{-2}^{3} x^3 - 3x + 7\,dx$ $= \underline{175/4}$

$= \frac{x^4}{4} - \frac{3x^2}{2} + 7x \Big|_{x=-2}^{x=3}$

$= \left[\frac{(3)^4}{4} - \frac{3(3)^2}{2} + 7(3)\right] - \left[\frac{(-2)^4}{4} - \frac{3(-2)^2}{2} + 7(-2)\right]$

$= \frac{111}{4} - (-16)$

3. Evaluate the following integrals using u-substitution.

(a) $\displaystyle\int \frac{\sin(\sqrt{x})}{\sqrt{x}} dx$ $= \underline{-2\cos(\sqrt{x})+C}$

(1) LET $u = \sqrt{x}$, $du = \frac{1}{2\sqrt{x}} dx \Rightarrow 2du = \frac{1}{\sqrt{x}} dx$

(2) SUBSTITUTE: $\displaystyle\int 2\sin(u)\,du$

$= -2\cos(u) + C$

$= -2\cos(\sqrt{x}) + C$

4. Evaluate the following integrals.

(a) $\displaystyle\int_2^3 3x\sqrt{x^2-4}\, d\theta$ $= \underline{5^{3/2}}$

(1) LET $u = x^2 - 4$, $du = 2x\,dx \Rightarrow \frac{1}{2} du = x\,dx$

(2) BOUNDS: IF $x = 3$, $u = 3^2 - 4 = 5$

IF $x = 2$, $u = 2^2 - 4 = 0$

(3) SUBSTITUTE: $\displaystyle\int_{u=0}^{u=5} \frac{3}{2}\sqrt{u}\,du = \int_0^5 \frac{3}{2} u^{1/2} du = u^{3/2}\Big|_{u=0}^{u=5}$

$= 5^{3/2} - 0^{3/2}$

$= 5^{3/2}$