Name: due September 9 by 3:00 pm Pacific

Math 126 **Homework Assignment 7** **Fall 2020**

1. Evaluate $\int \frac{12\,t}{(2t^2+8)^2}\,dt$.

let $u = 2t^2 + 8$

then $du = 4t\,dt$

so $3\,du = 12t\,dt$

$$\int \frac{12t}{(2t^2+8)^2}\,dt = \int \frac{3}{u^2}\,du$$
$$= -\frac{3}{u} + C$$
$$= -\frac{3}{2t^2+8} + C$$

or

guess: $(2t^2+8)^{-1}$

check: $\frac{d}{dt}(2t^2+8)^{-1} = -(2t^2+8)^{-2}(4t)$
$$= \frac{-4t}{(2t^2+8)^2}$$

need $\cdot(-3)$

2. Evaluate $\int \frac{x+3}{\sqrt{x-4}}\,dx$.

let $u = x-4$

then $du = dx$

and $u+7 = x+3$

$$\int \frac{x+3}{\sqrt{x-4}}\,dx = \int \frac{u+7}{u^{1/2}}\,du$$
$$= \int \left(u^{1/2} + 7u^{-1/2}\right) du$$
$$= \frac{2}{3}u^{3/2} + 14u^{1/2} + C$$
$$= \frac{2}{3}(x-4)^{3/2} + 14(x-4)^{1/2} + C.$$

$$= \frac{2}{3}(x-4)^{1/2}\left(x-4+21\right) + C$$
$$= \frac{2}{3}(x+17)\sqrt{x-4} + C$$

different forms possible for the final answer

3. Evaluate $\int_0^{\sqrt{2}} t\sqrt{4-t^4}\,dt$.

let $u = t^2$

then $du = 2t\,dt$

$$\int_0^{\sqrt{2}} t\sqrt{4-t^4}\,dt = \frac{1}{2}\int_0^2 \sqrt{4-u^2}\,du$$ [change limits]

$$= \frac{1}{2}\cdot\frac{1}{4}\cdot\pi\cdot 2^2$$ area of circle

$$= \frac{\pi}{2}.$$

4. Evaluate $\int_0^4 \frac{1}{1+\sqrt{x}}\,dx$.

let $u = 1+\sqrt{x}$

then $x = (u-1)^2$

and $dx = 2(u-1)\,du$

$$\int_0^4 \frac{1}{1+\sqrt{x}}\,dx = \int_1^3 \frac{2(u-1)}{u}\,du$$

$$= \int_1^3 \left(2 - \frac{2}{u}\right)du$$

$$= (2u - 2\ln u)\Big|_1^3$$

$$= (6 - 2\ln 3) - (2 - 2\ln 1)$$

$$= 4 - 2\ln 3.$$