

4.5 HW

1, 3, 5, 11, 27, 35, 37, 45, 47, 55, 59, 63, 69, 73
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1) $\int (8x^2+1)^5 (16x) dx \rightarrow \boxed{u = (8x^2+1)} \rightarrow \boxed{du = 16x dx}$

3) $\int \tan^2 x \sec^2 x dx \rightarrow \boxed{u = \tan x} \rightarrow \boxed{du = \sec^2 x dx}$

5) $\int (1+6x)^4 (6) dx \rightarrow \int (u)^4 \frac{du}{6} = \frac{1}{6} \int u^4 du = \frac{1}{6} \cdot \frac{1}{5} u^5 + C = \boxed{\frac{1}{30} (1+6x)^5 + C}$

$u = 1+6x$
 $du = 6 dx$
 $dx = \frac{du}{6}$

11) $\int x^2 (x^3-1)^4 dx \rightarrow \int x^2 (u)^4 \frac{du}{3x^2} = \frac{1}{3} \int u^4 du = \frac{1}{3} \cdot \frac{1}{5} u^5 + C = \boxed{\frac{1}{15} (x^3-1)^5 + C}$

$u = x^3 - 1$
 $du = 3x^2 dx$
 $dx = \frac{du}{3x^2}$

27) $\frac{dy}{dx} = 4x + \frac{4x}{\sqrt{16-x^2}} \rightarrow \int dy = \int 4x dx + \int \frac{4x}{(16-x^2)^{1/2}} dx \rightarrow y = 2x^2 + \int \frac{4x}{u^{1/2}} \cdot \frac{du}{-2x} + C$

$u = 16-x^2$
 $du = -2x dx$
 $dx = \frac{du}{-2x}$

$y = 2x^2 - \int 2u^{-1/2} du$

$y = 2x^2 - 4(16-x^2)^{1/2} + C$

33) $\int \pi \sin(\pi x) dx \rightarrow \int \sin u \frac{du}{\pi} = -\cos u + C = \boxed{-\cos(\pi x) + C}$

$u = \pi x$
 $du = \pi dx$
 $dx = \frac{du}{\pi}$

37) $\int \frac{1}{\theta^2} \cos \frac{1}{\theta} d\theta \rightarrow \int \frac{1}{u^2} \cos u du \cdot -\theta^2 = -\int \cos u du = -\sin u + C = \boxed{-\sin \frac{1}{\theta} + C}$

$u = \frac{1}{\theta} \rightarrow \theta^{-1}$
 $du = -\theta^{-2} d\theta$
 $d\theta = du \cdot -\theta^2$

45) $f(x) = \int 2x (4x^2-10)^2 dx \rightarrow \int 2x (u)^2 \frac{du}{8x} = \frac{1}{4} \int u^2 du = \frac{1}{12} u^3 + C = \frac{1}{12} (4x^2-10)^3 + C$

(2, 10)

$u = 4x^2 - 10$
 $du = 8x dx$
 $dx = \frac{du}{8x}$

$10 = \frac{1}{12} (4(2)^2 - 10)^3 + C \rightarrow 120 = (6-10)^3 + 12C$

$120 = 216 + 12C \rightarrow -96 = 12C \quad C = -8$

$f(x) = \frac{1}{12} (4x^2-10)^3 - 8$