

REVIEW PROBLEMS FOR QUIZ 3

(Note that all problems are odd-numbered problems from the textbook, so the answers are in the back of the book.)

Antiderivatives

Find the most general antiderivative of the following functions:

$$3.7.3 \quad f(x) = 7x^{\frac{2}{5}} + 8x^{-\frac{4}{5}}$$

$$3.7.5 \quad f(x) = 3\sqrt{x} - 2\sqrt[3]{x}$$

$$3.7.11 \quad f(x) = 2 \sec t \tan t + \frac{1}{2}t^{-\frac{1}{2}}$$

$$3.7.15 \quad f(x) = \frac{x^5 - x^4 + 2x}{x^4}$$

$$3.7.19 \quad \text{Find the most general form of } f \text{ where } f''(t) = \frac{2}{3}t^{\frac{2}{3}}.$$

$$3.7.21 \quad \text{Find the most general form of } f \text{ where } f'''(t) = \cos t.$$

$$3.7.31 \quad \text{Find } f \text{ where } f''(x) = \frac{1}{x^2}, x > 0, f(1) = 0, \text{ and } f(2) = 0.$$

Evaluate the following integrals by interpreting them as areas of regions under curves and then using basic geometry.

$$4.2.31 \quad \int_{-2}^1 (1 - x) dx$$

$$4.2.35 \quad \int_{-2}^1 |x| dx$$

Integration with the evaluation theorem

$$4.3.3 \quad \int_{-2}^0 \left(\frac{1}{2}t^4 + \frac{1}{4}t^3 - t \right) dt$$

$$4.3.7 \quad \int_0^{\pi} (4 \sin \theta - 3 \cos \theta) d\theta$$

$$4.3.11 \quad \int_0^1 x (\sqrt[3]{x} + \sqrt[4]{x}) dx$$

$$4.3.21 \quad \int_1^{64} \frac{1 + \sqrt[3]{x}}{\sqrt{x}} dx$$

4.3.41 $\int x\sqrt{x} dx$

4.3.43 $\int (x^2 + x^{-2}) dx$

4.3.45 $\int (u + 4)(2u + 1) du$

Fundamental theorem of calculus

4.4.5 Evaluate $\frac{d}{dx} \int_1^x \frac{1}{t^3 + 1} dt$.

4.4.7 Evaluate $\frac{d}{dx} \int_5^s (t - t^2)^8 dt$.

4.4.9 Evaluate $\frac{d}{dx} \int_2^{\frac{1}{x}} \sin^4 t dt$.

4.4.11 Evaluate $\frac{d}{dx} \int_0^{\tan x} \sqrt{t + \sqrt{t}} dt$.

4.4.15 Find the average value of $g(x) = \sqrt[3]{x}$ on the interval $[1, 8]$.

4.4.17 Find the average value of $g(x) = \cos x$ on the interval $[0, \frac{\pi}{2}]$.

Substitution rule (u -substitution)

4.5.7 $\int (1 - 2x)^9 dx$

4.5.15 $\int \frac{a + bx^2}{\sqrt{3ax + bx^3}} dx$

4.5.19 $\int (x^2 + 1)(x^3 + 3x)^4 dx$

4.5.25 $\int \sec^3 x \tan x dx$

4.5.31 $\int_0^1 \cos \frac{\pi t}{2} dt$

4.5.35 $\int_0^\pi \sec^2 \frac{t}{4} dt$

4.5.41 $\int_{\frac{1}{2}}^1 \frac{\cos x^{-2}}{x^3} dx$

4.5.43 $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} (x^3 + x^4 \tan x) dx$