Name: _____

Definite Integrals

Exercise 1: Use the fundamental theorems of calculus to calculate each of the definite integrals given.

1) $\int_1^2 (x+1)^2\,dx$

2) $\int_1^8 \frac{t-1}{\sqrt[3]{t^2}}\,dt$

3) $\int_{\pi/3}^{\pi/2} \csc\theta\cot\theta\,d\theta$

4) $\int_0^{x^2+1} t^2 \mathrm{dt}$

5) $\int_0^x xf(t)\mathrm{dt}$

6) $\int_x^{x^2} f(t)\mathrm{dt}$

7) $\int_0^1 \sqrt[4]{x^5}+\sqrt[5]{x^4}\,dx$

8) $\int_0^{\frac{\pi}{4}} \sin 4x dx$

9) $\int_{-1}^{3} (x^2+x+1)dx$

10) $\int_4^9 \sqrt{x}dx$

11) $\int_{-2\pi}^{2\pi} (\sin^2(x)+\cos^2(x))dx$

12) $\int_0^1 \frac{1}{4+4x^2}dx$

13) $\int_0^{\frac{\pi}{3}} \sin x\cos^2 x dx$

14) $\int_0^a x\sqrt{a^2-x^2}dx$

15) $\int_1^2 x^2\ln\left(x^3+2\right)dx$

16) $\int_{-1}^{-2} \frac{dx}{\sqrt{x^2+2x+2}}$

17) $\int_0^{13} \frac{dx}{\sqrt[3]{(1+2x)^2}}$

18) $\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \tan\frac{1}{2}xdx$

19) $\int_{-1}^{1} (2+x)^4\,dx$

20) $\int_0^6 (t^2+3t)dt$

21) $\int_{-1}^{3} (2t^3+7)dt$

22) $\int_0^5 4+e^t dt$

Exercise 2: Use the fundamental theorems of calculus to find an antiderivative F of the given function f having the specified initial value.

1) $f(x) = 2^{-x^2}$; F(1) = 0

2) $f(x) = \cos^2(x)$; F($-\pi$) = 0

3) $f(x) = \frac{1}{x}$; F($\sqrt{17}$) = 0

Exercise 3: A flue epidemic is spreading at a rate $\frac{dn}{dt} = 180t - 6t^2$ where n is the number of people who are sick with flue on any particular day t after the outbreak started. Determine the number of people who are sick at any day t assuming that no one had the flu at the beginning. How many people have the flu the 10^{th} day after the outbreak begins?