NAME _____ DATE _____

AP Calculus AB

Practice for The Fundamental Theorem of Calculus Exam

Find the general indefinite integral for the following.

1. $\int(\cos x - 2\sin x)\,dx$

$2\cos x + \sin x + C$

2. $\int x(1+2x^4)\,dx$

$= \int (x + 2x^5)\,dx = \frac{x^2}{2} + \frac{x^6}{3} + C$

3. $\int(x^2 + 1 + \frac{1}{x^2+1})\,dx$

$= \frac{x^3}{3} + x + \tan^{-1}x + C$

Use Part 1 of the Fundamental Theorem of Calculus to find the derivative for the following.

4. $h(x) = \int_1^x t^2 \sin t\,dt$ x^2

5. $F(x) = \int_x^5 \tan\theta\,d\theta$ $= -\int_5^x \tan\theta\,d\theta = -\tan x$

6. $y = \int_{e^{2x}}^0 \sin^3 t\,dt$

$= -\int_0^{e^{2x}} \sin^3 t\,dt = -\sin^3 e^{2x} \cdot 2e^{2x}$

Use Part 2 of the Fundamental Theorem of Calculus to evaluate the integral.

7. $\int_0^1 x^2\,dx$ $F(x) = \frac{x^3}{3}$ $F(1) - F(0) = \frac{1}{3}$

8. $\int_{-4}^2 \frac{2}{x^6}\,dx$ $F(x) = \frac{2x^{-5}}{-5}$ $F(2) - F(-4) = \infty$

9. $\int_{-e^2}^{-e} \frac{3}{x}\,dx$ $3x^{-1}$ $F(x) = 3\ln|x|$ $F(-e) - F(-e^2) = -3$

10. $\int_{-1}^3 |2x - x^2|\,dx$

$2x - x^2 = 0$

$-x^2 + 2x = 0$

$-x(x-2) = 0$

$0, 2$

$F(x) = -x^2 + \frac{x^3}{3}$ $F(x) = x^2 - \frac{x^3}{3}$

$\int_{-1}^0 (-2x + x^2)\,dx + \int_0^2 (2x - x^2)\,dx + \int_2^3 (-2x + x^2)\,dx$

$\frac{4}{3} + \frac{4}{3} + \frac{4}{3}$

$= 4$