AP Calculus

Warm Up Day 74

Name _____ Date _____

1. The graph shows the velocity of a ladybug that is moving along a straight line for t on $[0, 6]$.

   What is the maximum speed of the object?

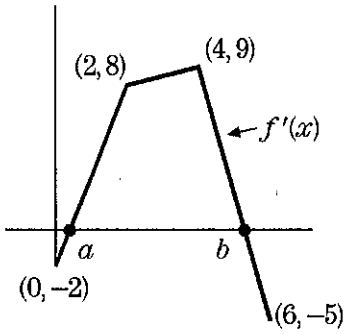
   a) 6 units/sec

   b) 4 units/sec

   c) 9 units/sec

   d) 5 units/sec

   e) 8 units/sec



2. A point moves on the graph of $y = x^3 - x$ so that, when the point is at $(x, x^3 - x)$, the rate of change of x with respect to time is $\frac{1}{x}$. Find the rate of change of y with respect to time when $y = 6$.

   a) $\frac{1}{6}$ b) $\frac{7}{3}$ c) 3 d) $\frac{11}{3}$ e) $\frac{11}{2}$

3. A ladder 15 ft in length leans against a vertical wall, with the bottom of the ladder 5 ft from the wall on a horizontal floor. If at that time the bottom end of the ladder is being pulled away at the rate of 2 ft/s, at what rate does the top of the ladder slip down the wall?

   a) $\frac{\sqrt{2}}{2}$ ft/s b) 1 ft/s c) 3 ft/s

   d) $\frac{2\sqrt{5}}{3}$ ft/s e) 2 ft/s

4. If $f(x) = x^3 + 3x^2 + 2x + 7$, then the equation of the tangent at the point of inflection is

   a) $x - y = 4$ b) $x + y = 4$ c) $y - 4 = 0$

   d) $x - y = -4$ e) $y + 4 = 0$

4.2 Derivative Rules Backwards

FIND THE FOLLOWING INDEFINITE INTEGRALS.

857. $\int (x^3 + 2)\ dx$

858. $\int (x^2 - 2x + 3)\ dx$

859. $\int (x^{3/2} + 2x + 1)\ dx$

860. $\int \left(\sqrt{x} + \frac{1}{2\sqrt{x}}\right)\ dx$

861. $\int \sqrt[3]{x^2}\ dx$

862. $\int \frac{1}{x^3}\ dx$

863. $\int \frac{x^2 + 1}{x^2}\ dx$

864. $\int x^2\sqrt{x}\ dx$

865. $\int 3\ dx$

866. $\int (x^2 - \sin x)\ dx$

867. $\int (1 - \csc x \cot x)\ dx$

868. $\int (\sec^2\theta - \sin\theta)\ d\theta$

869. $\int \sec\theta(\tan\theta - \sec\theta)\ d\theta$

870. $\int \frac{8}{x^{3/5}}\ dx$

871. $\int \frac{-3x}{\sqrt[3]{x^4}}\ dx$

872. $\int 7x^3(3x^4 - 2x)\ dx$

873. $\int \frac{7\sqrt{x} - 3x^2 - 3}{4\sqrt{x}}\ dx$

874. $\int e^x\ dx$

875. $\int 2^x \ln 2\ dx$

876. $\int 5e^x\ dx$

877. $\int \frac{1}{x^2 + 1}\ dx$

878. $\int \frac{3}{\sqrt{1 - x^2}}\ dx$

The scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living. Of course I do not here speak of that beauty that strikes the senses, the beauty of qualities and appearances; not that I undervalue such beauty, far from it, but it has nothing to do with science; I mean that profounder beauty which comes from the harmonious order of the parts, and which a pure intelligence can grasp. —*Henri Poincaré*

Student Name: _____ **Score:**

Basic Integration

Integrate the following w.r.t. x

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

$$\int (4x^3 + \csc^2 x + \frac{2}{x^2})dx$$

$$\int (\cos x + \sec^2 x - 4x^3)dx$$

$$\int (e^x + \frac{e^{7x}}{2} + \sin x)dx$$

$$\int (\frac{7}{5}x^4 + \sin 3x + 3\cos^2 x)dx$$

$$\int (\frac{1}{x+7} - \sin x + \cos x)dx$$

$$\int (x^5 + \frac{x^7}{3} + \sin^2 x)dx$$

$$\int (\frac{3}{x+4} + \cos 7x - \sin^2 x)dx$$

$$\int (\sin 4x + e^{3x} + 5x^4)dx$$

$$\int (2x^7 + \frac{e^{3x}}{4} + \csc^2 x)dx$$

Student Name: _____ Score:

Integration using Power Rule

Integrate the following w.r.t. x

$\int 4x^3 dx$

$\int (7x^3 - \frac{4}{5}x^{\frac{-9}{2}} + x^{\frac{4}{3}})dx$

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

$\int (\frac{2x^2}{\sqrt{x}} + \frac{3\sqrt{x}}{7x^2})dx$

$\int (\frac{8}{\sqrt{x}} + 7\sqrt{x})dx$

$\int (\frac{x}{\sqrt{x^3}} + \frac{4x^3}{3} + \frac{\sqrt[3]{x}}{2})dx$

$\int (8x^5 + 7)dx$

$\int (\frac{6x^{\frac{-5}{3}}}{5} - 1)dx$

$\int (5x^9 + 4x^{-9})dx$

$\int (\frac{5x^{\frac{-3}{2}}}{x} + \frac{x^{\frac{7}{3}}}{4x^2})dx$

$\int (\frac{4x^7}{5} - 3\sqrt[5]{x})dx$

$\int (\frac{x^{\frac{1}{3}} - x^{\frac{1}{2}}}{\sqrt[3]{x}})dx$